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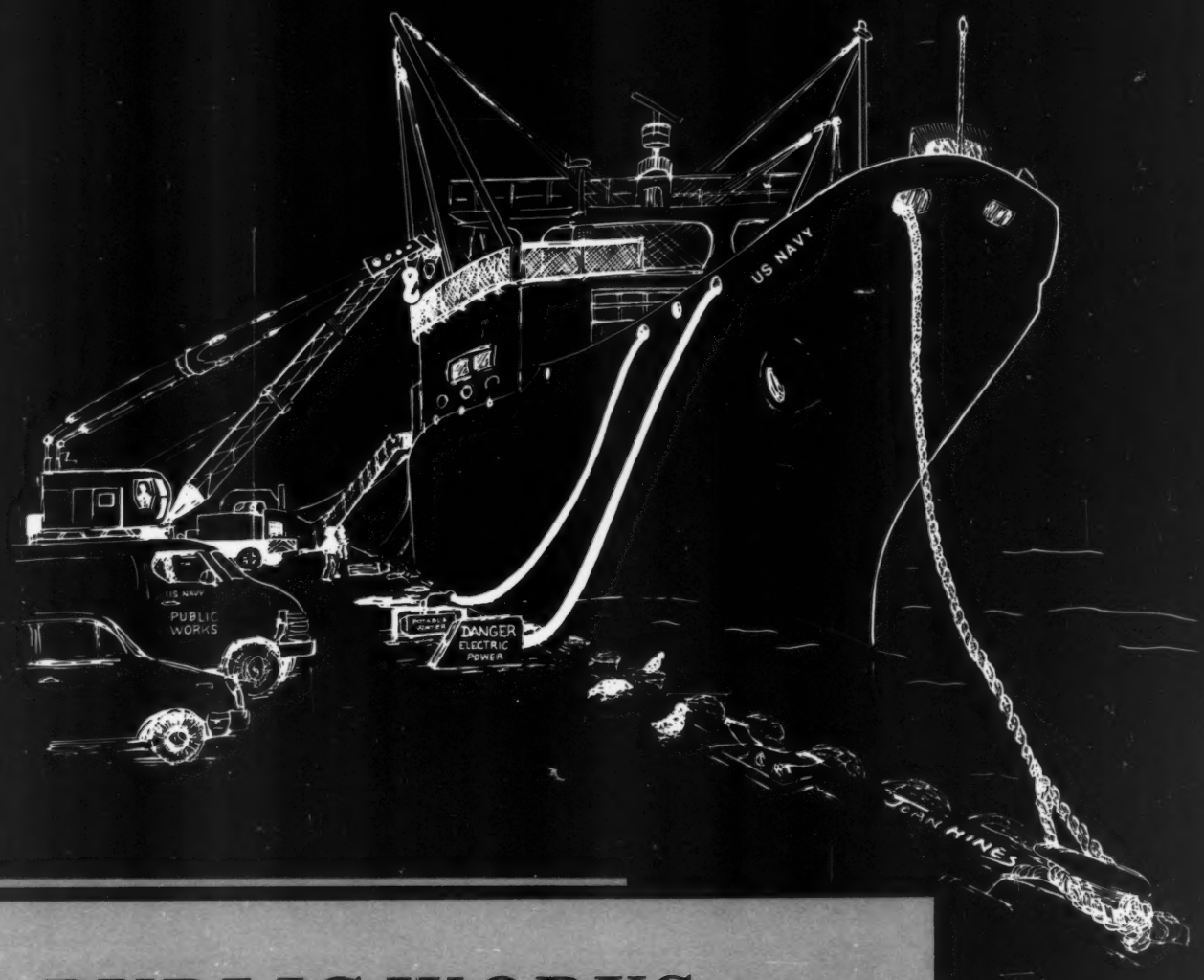


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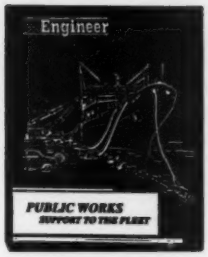
Phone (202) 694-3635
AV 224-3635

**Lt. (j.g.) Mark Leemaster, CEC, USNR**
WESTDIV, Code 09L1
P.O. Box 727
San Bruno, CA 94066-0720
Phone (415) 877-7103
AV 859-7103

**Lt. John Heinzel, CEC, USN**
CHESDIV
Washington Navy Yard
Washington, DC 20374
Phone (202) 433-7285
AV 288-7285




This issue's cover was illustrated by our contributing artist, Joan Hines, highlighting our theme of public works.

NAVY CIVIL **Engineer**

FALL 1988 Vol. XXVIII, No. 2

**BENJAMIN F. MONTOYA**
Rear Admiral, CEC, USN
Commander
and
Chief of Civil Engineers

**ALAN K. RIFFEY**
Rear Admiral, CEC, USN
Vice Commander
and
Deputy Chief of Civil Engineers

**ANNE-MARIE O'HARA**
Acting Editor

**LES HELSDON**
Contributing Editor

**JOAN HINES**
Contributing Artist

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| Winter 1989-90 | Public Works | Oct. 15, 1989 | Jan. 1-15, 1990 |

*A new generation of Seabees*

# Military Construction Representatives

**By LCDR RICHARD B. HUNTER, JR., CEC, USN**
*Officer in Charge of Construction, Puerto Rico Area*
*Atlantic Division*
*Naval Facilities Engineering Command*
*Norfolk, Va.*

The Seabee "can do" spirit has taken on a new role in the form of resident officer in charge of construction (ROICC) military construction representatives. Seabees are now part of a new and still-emerging program designed to complement engineering field division (EFD) contract administration and augment the technical expertise of our men and women in green.

## Program History

The program was first initiated in 1981 by the Chief of Civil Engineers, RAdm. William M. Zobel, CEC, USN. Forty-one billets were approved and started coming on line in April 1985. All billets are now fully manned and distributed throughout the world at five of the six EFDs shown in the table.

Although all E-6 to E-9 Seabees are eligible for assignment, mostly chief petty officers and senior chief petty officers have been detailed to these jobs. Only top performers are considered for placement; they are carefully screened by Naval Military Personnel Command (NMPC) assistant head for Seabee assignments.

Billets are requested by the EFD based on specific contract and technical requirements. Candidates are trained at the Construction Inspection School at Shepard Air Force Base (AFB) in Texas, where they earn Navy Enlisted Classification Code (NEC) 5501 as Construction Inspector.

Cdr. Ronald C. Lewis, CEC, USN, NMPC head for Seabee assignments, says that the program is a great success. Feedback from various sources is positive. Because of the program's success, plans have been initiated to double the number of billets. Recent budget constraints, however, may postpone any growth until 1991. Nonetheless, the existing programmed billets appear secure given the current funding levels.

## Lessons Learned--One EFD's Perspective

The Atlantic Division, Naval Facilities Engineering Command (LANTDIV) conducted a military construction representative conference to evaluate the program. According to RAdm. David E. Bottorff, CEC, USN, Commander, LANTDIV, the program is an unqualified success. This is based on feedback received from the ROICCs, customers, and both the civilian and military construction representatives (CONREPS) themselves.

While the program is alive and well, it did not achieve this status without some growing pains. In addition, there is always room for improvement. LANTDIV has initiated a number of recommendations to improve the program and the Seabees' transition to the ROICC office based on feedback received during the conference. Two of these key initiatives include adequate training and easing the transition to the new role.

While the construction inspector school at Shepard AFB provides the training necessary for assignment of NEC 5501, most Seabees feel it is too basic for the caliber of the senior enlisted members that attend. This situation is expected to improve when the Naval Construction Training Center, Gulfport, completes a Navy version of the course better suited to the more experienced military CONREPs. In the interim, LANTDIV has started to send its military CONREPs to the Army Corps of Engineers general inspection course.

For most military CONREPs this assignment represents their first opportunity to work with private contractors and NAVFAC's engineering/contracts organization. To better acquaint Seabees with the system, sponsors are assigned to incoming CONREPs and "welcome aboard" packages are sent to help orient them to their new environment.

LANTDIV has developed a training package which explains how the EFD is organized and newly assigned CONREPs are encouraged to visit LANTDIV early in the tour. This permits them to meet the players they will be working with over the next few years and see first-hand how the organization is set up and operated on a daily basis.

**EA1 C. H. Laird, USN (left) and Ens. H. Arellano, CEC, USN inspect roofing system at Atlantic Fleet Weapons Training Facility annex office on Vieques Island, just off the shore from U.S. Naval Station, Roosevelt Roads, Puerto Rico.**

Finally, a "division officer"/mentor is assigned each Seabee to assist in the transition to this new environment as well as to ensure that necessary administrative support is available, such as personnel support detachment services.

## Contract Inspections--Background

A review of the government's inspection role is needed in order to better understand the roles and responsibilities of our Seabee CONREPs. The Inspection of Construction clause found in the Federal Acquisition Regulations (FAR 52.246-12) and included in construction contracts in excess of $2,000 provides the government's right to inspect and test all work being provided under the contract. It is important to note that this is the government's right and not a duty.

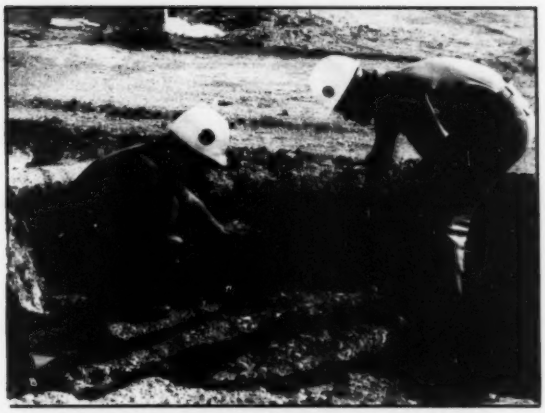
Inspection is performed prior to acceptance and may be performed at any time as long as it is reasonable and not disruptive to the contractor's operations. In addition, the work may be inspected and reinspected to protect the government's interests. Inspections and tests by the government may not be construed as constituting or implying acceptance nor does it relieve the contractor of responsibility for damage or material loss prior to acceptance.

The contractor must maintain an adequate internal inspection system to ensure that the work complies with the contract requirements. Contract clauses indicate that the government will inspect work under the general direction of the contracting officer. Inspectors are not authorized to change any contract provision without prior written authorization of the contracting officer.

## What Does a Seabee CONREP Do?

The CONREP is a key player on the ROICC team. He or she is the "eyes and ears" of the contracting officer and the assistant ROICC (the engineer assigned responsibility for the administration of the contract). He/she is responsible for daily reporting and recording what occurs at the job site. Some of the highlights of the CONREP's job are:

- The CONREP is the individual most familiar "with the contract plans and specifications. His/her job starts with the review of the design prior to advertisement for bids. He/she determines whether or not the project can be completed as designed, that specified materials are available, and that there are no physical obstructions at the project site.
- The CONREP is also a key player in carrying out the government's quality assurance plan. He/she visits the project site daily and monitors the contractor's quality control plan and activities. He/she is expected to inspect work in any of the construction trades and must therefore have a broad base of construction skills to ensure that all aspects of the project comply with the contract requirements.
- The job requires expertise in reading and understanding the plans and specifications, not only for ensuring compliance but for resolving differences of opinion in interpretation with contractor and customer personnel.



**EA1 Laird (left) and Ens. D. Banasi, CEC, USN inspect pile cap excavations at the Seabee equipment maintenance facility, Camp Moscrip, Naval Station Roosevelt Roads, Puerto Rico.**

**EA1 Laird (left), Ens. Banasi, and contractor quality control supervisor inspect pile cutoffs at Seabee equipment maintenance facility, Camp Moscrip.**

This overview is not intended to be all-inclusive, but only to highlight the diversity of skills required for construction representatives. In addition to the responsibilities listed above, the construction representative is required to:

- Coordinate government services (office space, storage, government-furnished property, utilities, etc.)
- Witness contractor testing to ensure compliance
- Check and record the delivery of materials for approval of payments and incorporation into the work
- Monitor and record the use of contractor construction equipment
- Enforce the safety and labor provisions of the contract, and other duties

## One Seabee's Experience

Consider a Seabee's perspective after two years as a military construction representative (CONREP). Engineering Aide First Class Petty Officer (EA1) Charles H. Laird is assigned to the ROICC office, Puerto Rico area, as a military CONREP. He is assigned CONREP responsibilities for 16 to 18 construction projects valued at more than $8.5 million. These projects are being performed by both private contractors and the resident naval mobile construction battalion assigned to U.S. Naval Station Roosevelt Roads, Puerto Rico.

EA1 Laird has mixed emotions when describing his assignment as a military CONREP. "The job is great. Never in the past nine years of my career have I had the responsibility that this job has given me. I like the work and the challenges and it gives me an opportunity to show my abilities."

On the other hand, the job has not been easy due to a number of factors. One problem cited by Laird is the lack of adequate formal training to prepare for the job. "Most of the training occurs on the job. The diversified and highly technical skills demanded of me when I first arrived was a little disconcerting. I had to learn to work in an entirely different environment with a new set of rules and an organization that was unfamiliar to me." In addition, he felt that he had to prove his abilities and his technical worth to his civilian counterparts.

When he first arrived at Roosevelt Roads in 1986, some of the civilian CONREPs felt their civil service positions were in jeopardy. While this feeling has been overcome, it didn't make EA1 Laird's transition to the office any easier. This was especially apparent when he needed assistance from other CONREPs to help him solve construction problems in areas not within his technical expertise.

One of the greatest challenges and rewards for Laird has been working on projects performed by construction contractors from private industry. This provided some of his greatest challenges in part due to the magnitude of some of the projects assigned. For example, two of Laird's projects are a $2.8 million contract to build a new equipment maintenance facility at Camp Moscrip, Naval Station Roosevelt Roads, and a new $2.1 million range operations facility on Vieques Island for the Atlantic Fleet Weapons Training Facility. For EA1 Laird, the opportunity to be involved in such large "private" construction was at first overwhelming.

One of the benefits of this program has been his work with the Seabee battalions. EA1 Laird found that he was more readily accepted from the start. He wears the same uniform as those performing the work, and is familiar with the construction battalion's organization, construction methods, and quality control programs. In many instances he has served in previous assignments with those battalion personnel assigned to the project. Having worked both sides of the fence, EA1 Laird has now had the opportunity to see first-hand the sometimes conflicting effect that increased production can have on quality control.

One of the biggest rewards of assignment as a military CONREP according to Laird is the role that he plays in important decision making. He finds that his opinion is readily sought when problems arise and "it's followed!". For a First Class Petty Officer, he finds a level of authority and responsibility not normally found in other assignments. According to Laird, the military CONREP is a vital part of the ROICC organization, "you're not just another cog on the gear."

EA1 C. H. Laird (right) and Ens. D. Banaji inspect new culvert installation by airfield at Naval Station Roosevelt Roads.

### How Do You Sign Up?

If you are interested in finding out more about the program or about particular billets available, call your Seabee detailer. A primary point of contact at the Naval Military Personnel Command is Senior Chief (Steelworker) Copeland, who can be reached at Autovon 224-4564.

| Engineering Field Division | Number of Billets Assigned |
|---|---|
| Northern Division | 6 |
| Atlantic Division | 8 |
| Southern Division | 11 |
| Western Division | 9 |
| Pacific Division | 7 |

□

# speaking from topside

As CEC officers, we are uniquely placed as stewards and providers of the facilities needed in the Navy's shore establishment. The current funding situation indicates that after several years of rather substantial levels of funding for facilities investment, we are about to enter a period of severely constrained resources. Funding for MCON and BOS (MRP and OBOS) is of course just one patch in the entire quilt of the Navy's POM and budget process. Resource sponsors in OPNAV are assigned total topline dollar figures at the outset of the process, and then are forced to make hard allocation decisions between MPN, APN, WPN, SCN, OPN, O&MN, MCON, and RDT&E appropriations.

POM 90 has been concluded with issuance of the PDM by the Secretary of Defense on July 15, 1988, and the outlook for MCON and MRP in FY 1990 and FY 1991 is not bright--at least as viewed from the shore facilities investment perspective. Having observed that, we are faced with two possible reactions:

- Assume "no one up there" understands the situation, and give up in despair; or
- Press on--continue to seek ways to be more effective (doing the right things) and more efficient (doing things right), and find ways to make our message "sell better" to major claimants, resource sponsors, and POM decision makers. I am confident you will all join me in choosing the latter.

In past years, our MCON budget request annually suffered a 20 to 25 percent cut at the hands of Congress before funds were authorized and appropriated. FY 1989 represents a turnaround; we expect only a $30M reduction to a $1.6B request for Navy/Marine Corps design and construction. However, the FY 1990/91 budget is now being compiled at the $1.2B level. Even if we experience full congressional support for 1990/91, we would have a significantly smaller execution package than we have had for the past few years. Proposed MRP funding levels for FY 1990/91 are also experiencing a downturn from the FY 1988/89 levels.

Resource sponsors have identified a significant number of "overguidance" MCON projects--those considered important and worthy of FY 1990 funding, but which were not high enough priority to displace requirements in other appropriations which fit into the POM "core" program of the various sponsors.

We in OP-44 are now updating the CNO-approved 1986 Shore Facilities Life Extension Program and intend to demonstrate to CNO, NAVCOMPT, and resource sponsors that actions must be taken during final FY 1990 budget preparation to increase the MCON and MRP "topline" funding levels.

We will identify the adverse impact on the shore establishment--continued increase in average age of facilities (now 45 years); increased backlog of maintenance and repair (particularly in the critical investment categories of waterfront operations facilities, aviation operations facilities, training; troop housing and utilities); and projected decreases in base readiness as measured by BASEREP indicators C1-C4.

We are optimistic that we can show a factually persuading story, and get some funds added to the MCON and MRP accounts in FY 1990 and 1991 during the review process leading to submission of the FY 1990 budget in January 1989.

Those of you serving in public works and related staff billets can help us and help your individual activities in this instant process and in future budget preparations by ensuring thoroughness, accuracy, credibility, and professionalism in presenting each and every MRP and MCON project and in AIS and BASEREP documentation.

Spend time on project preparation to ensure that narrative descriptions of project requirements and "impact if not funded" sections are hard-hitting, convincing, and as dramatic as possible without compromising your integrity.

Specifically, when "facilities quantity" or "facilities condition" is rated as C3 or C4 under the BASEREP reporting system, ensure that an appropriate MCON or special project is developed and identified to correct the C3/C4 condition.

We don't want to "cry wolf," but neither do we want to be "eaten by him" because we failed to convince our station commanding officers, major claimants, and resource sponsors of the essential need to put sufficient hard-to-come-by money on critical MCON and MRP projects.

In the next few years there will be more than enough challenge in this area to keep all of us energized and working to our professional limits, and then some, to provide the robust shore establishment which our Navy must have to maintain its readiness and fighting edge. Ours is a vital support role! Let's all work together so that years in the future we can reflect with pride on our efforts and accomplishments.

**J. C. DOEBLER**
Rear Admiral, CEC, USN
Director, Shore Activities Division
Office of the Chief of Naval Operations

# Planning for the waterfront

## and 'taming' some of the problems

**By WILLIAM EDDY**
*Facilities Planner*
*Naval Facilities Engineering Command*
*Headquarters*
*Alexandria, Va.*

*and*

**JULIA MARTIN**
*Associate Staff Engineer*
*Facilities Engineering Project Office*
*Advanced Technology, Inc.*
*Reston, Va.*

Planning for facilities at the Navy waterfront is like trying to hit a moving target. Nothing ever stays the same. Homeporting plans for activities such as the Naval Station Norfolk and the Naval Station San Diego change daily. New ship types and upgraded ships enter ports faster than planners can develop facilities to support them. Traditionally, the approach has been to develop berthing plans and facility/utility requirements to support them for an initial ship mix, then "massage" them as fleet input is received.

It is a mistake to think of these planning problems as "exercises" that have a beginning and end. Planning for the waterfront is a continuous process.

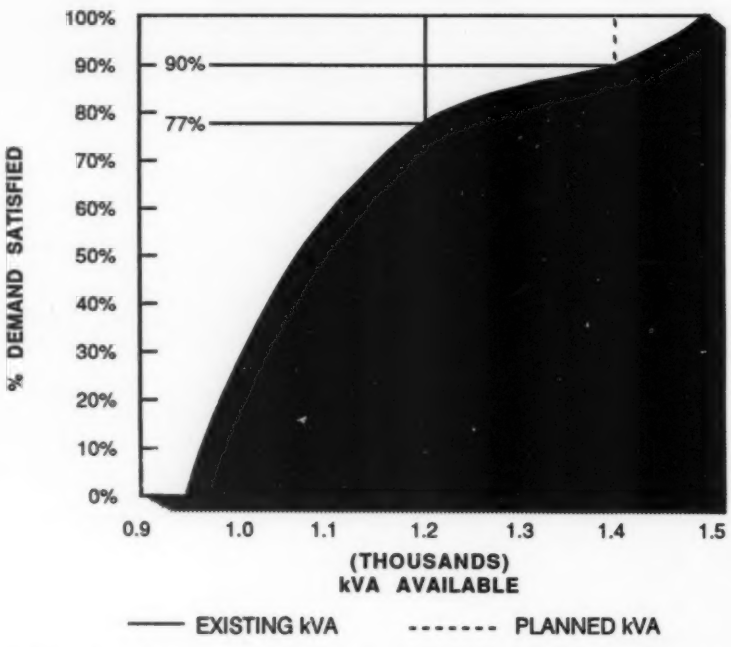



**Figure 1. A simulated comparison is shown of existing (77 percent) and planned (90 percent) electrical capacity at Naval Station Norfolk Pier 25.**

### Concept

With the introduction of the personal computer (PC) considerable thought was given as to how this difficult planning problem could be tamed. Perhaps the PC's ability to develop and store numerous scenarios and analyze them consistently could be applied.

Needed was a modeling program that would assist the facility planner at the activity and engineering field division (EFD) in developing rapid alternatives to these constantly changing problems. The model should simulate the day-to-day operations at the waterfront and generate facility/utility requirements based on selected ship mixes input by the user. The model would develop resulting deficiency deltas and rough cost estimates for eliminating them. These could then be used to develop military construction project scopes for homeporting and integrated logistics support studies. Also needed was a picture of what the waterfront will look like on any given day!

Naval Facilities Engineering Command's (NAVFAC's) research, development, test, and evaluation division and facilities planning division initiated a research project to seek an automated solution to the problem. The firm of Advanced Technology, Inc., of Reston, Va., was contacted to determine the model's feasibility as a first phase. Subsequent phases were to be conducted as necessary.

### Phase I

In Phase I, an investigation was made of the methodology of developing a port simulation and determined how utility system demand could be predicted. The Phase I scope was limited to investigating the electrical demand for the DD963 (SPRUANCE) class of ship at Naval Stations Norfolk and San Diego. Work included developing a prototype methodology, investigating on-site waterfront conditions at Norfolk and San Diego, investigating electrical consumption on board the ship, evaluating hardware and software options, and coding the simulation program.

The Phase I demonstration program runs on a IBM-compatible PC and consists of FORTRAN and BASIC programs that output data to a Lotus 1-2-3 spreadsheet. Two FORTRAN programs simulate daily port operations and ship evolutions and accumulate the results. The numbers of homeported ships, their operating tempo and berthing tendencies are combined to produce a probablistic in-port profile (Figure 1).

Physical ship characteristics such as draft, length, and width are compared to the actual facility dimensions to determine approximate ship berthing locations. The electrical requirement of the DD963 is then adjusted for local geographic position and time of year to produce a demand profile. This can then be compared to the electrical assets at each berth to determine utility deficiencies.

The Phase I version of the Waterfront Planning Model actually contains four interactive submodels. They are:

- Ship Employment Model--This model runs in either static (ships remain in port at piers) or dynamic (ships enter and leave port) mode. It uses OPNAV ship scheduling data which can be overridden by the user. The model accepts up to 20 ships at any one port.

- Berthing Model--This model allows local berthing practices to influence ship location. It prioritizes berths per ship class and then compares ship's characteristics to facility assets to confirm a successful berthing. Assets considered include water depth, berth length, slip width, and electrical receptacles.

- Electrical Power Consumption Model 40--This model is derived from the DD963's electrical circuitry. Ship load centers are categorized as: (1) always active, (2) periodically active at known levels, (3) periodically active at random levels, (4) heating, and (5) cooling. These are introduced at the appropriate hour and totaled for comparison with existing assets.

- Weather Model--This model is used for HVAC analysis. It requires input of time zone, latitude, and longitude and is based on historical data provided by the National Climatic Data Center.

Since Phase I is a feasibility demonstration, the overall model capability is limited to processing approximately one million calculations per ship per month. The product successfully demonstrates the feasibility of the approach but is of limited use without further enhancement.

**Working out the details.**

### Phase II

Facility planners from various EFDs reviewed Phase I and recommended greater emphasis on graphic output as opposed to utility calculations. Therefore, Phase II was directed to add greater interaction and graphic map output.

It was also emphasized to make maximum use of existing graphic products within the NAVFAC family. The most logical source of computerized maps was the Graphic Engineering and Mapping System (GEMS). This mini-computer system has been used at headquarters and the EFDs for activity base map preparation and site plan development since 1982. Dr. Steve Gonzales of the Naval Civil Engineering Laboratory has also done considerable work developing computer models of Navy ships, as part of the Pier Engineering System (PIERS) program. This project began as a GEMS application and is now being translated to AutoCAD.

The product of Phase II, titled the Computer-aided Berthing (CAB) model, replaced the BASIC programs with screens developed using R:Base System V software. The model outputs data to AutoCAD which contains an activity base map downloaded from GEMS. Ship symbols taken from the PIERS program are then inserted at their berthing locations to produce a berthing plan for any given day. The CAB model contains three modules:

- Physical Database Module--Three R:Base tables store data about physical facility sizes, ship information, and berthing preferences and locations.

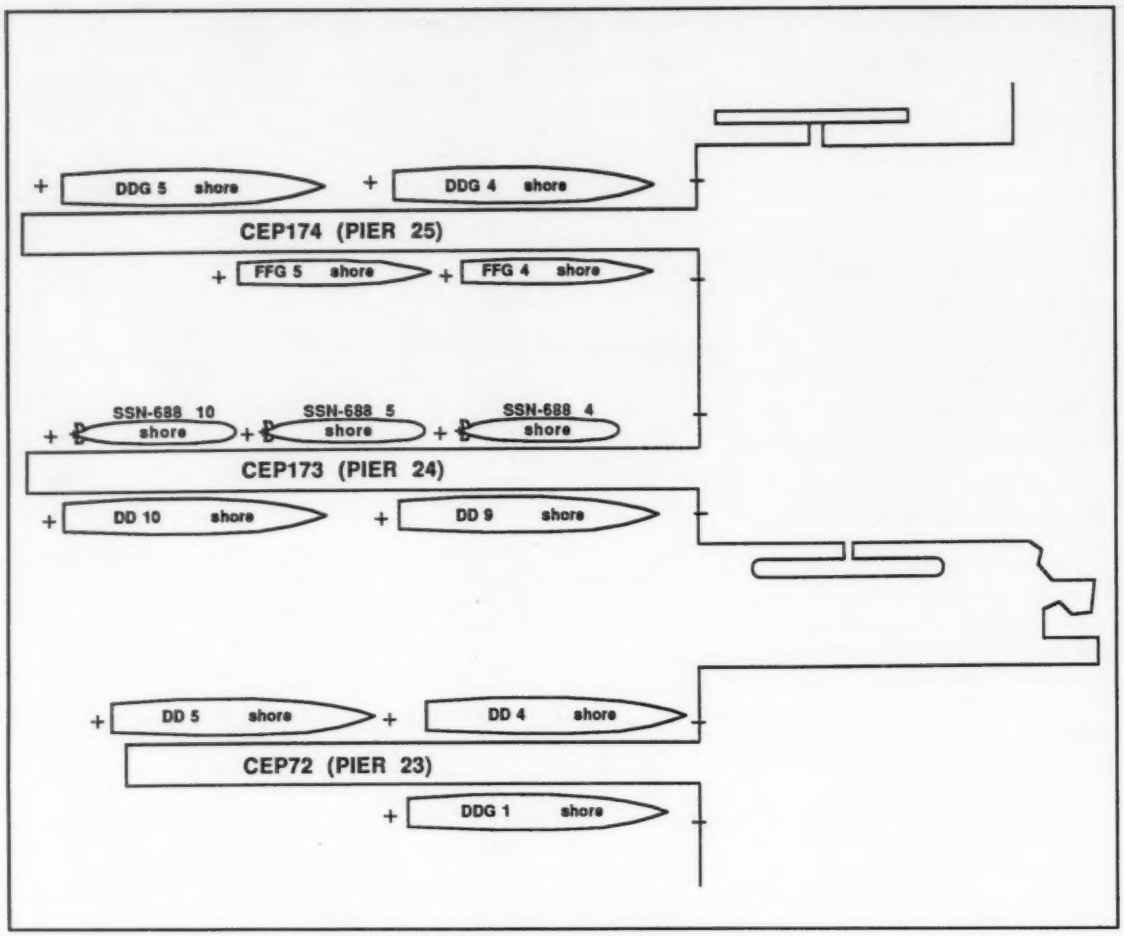



**Figure 2. A hypothetical berthing plan for Naval Station Norfolk Piers 23, 24, and 25 for a day selected by the user.**

- Deployment Module--This module contains the operating tempo of each ship. Using a FORTRAN probability algorithm, it determines which ships are in port at any time. This list of ships is input to the third module.

- Berthing Module--The berthing module, also programmed in FORTRAN, assigns a berth to each ship using common Navy berthing and nesting techniques. All available piers and homeported ships must be in the database to achieve a realistic simulation. However, hypothetical situations may also be modeled.

The model produces the berthing profile in graphic and nongraphic form. The nongraphic form is an R:Base table containing the ship name, the time of year in Julian days, and the assigned berth. This list can be interfaced with other programs. The graphic output is a scaled AutoCAD drawing. Figure 2 is a sample output. Similar displays can be performed for any Navy activity having homeported or visiting ships.

## Future

Based on the success of Phases I and II, support will be given to development of a fully operational waterfront planning model. Enhancements will include a generic ship model to produce electrical, steam, water, compressed air, fuel, sewage, and oily/hazardous waste requirements. Correction tables will simulate different ship classes and upgrades. The model will interface with NAVFAC's cost engineering system to permit the user to make cost benefit tradeoffs. Ultimately, requirements for all ship-related facilities including warehouses, berthing, etc. may be generated by the model. □

# Three tension membrane structures built in one month . . . within funding!

**By LT JAY A. GRAVEN, CEC, USNR**
*P.E., S.C.*
*Staff Civil Engineer*
*Naval Supply Center*
*Charleston, S.C.*

A challenge facing all shore activities is the ability to construct needed facilities under the $200,000 military construction funding limitation. Naval Supply Center (NSC) Charleston, in a novel approach to meeting this challenge, recently constructed three tension membrane structures (TMS), almost 33,000 total square feet, each under the $200,000 funding limitation by using NSC reservists and personnel from Construction Battalion Unit (CBU) 412.

A paramount concern was the ability of the reserve storekeepers, mess specialists, and personnelmen to construct tubular steel trusses and erect the building. However, with the manufacturer's technical representatives and the skills of the Seabees, the lack of skilled labor was successfully overcome. The table illustrates the costs of each building and the estimated costs to construct a comparable warehouse with metal siding.

NSC developed three self-help special projects aimed at reducing a covered storage space shortage. The primary purpose of these buildings is to provide protection from the weather elements to materials normally stored outside. The number of line items and cubic storage at NSC Charleston has grown approximately 25 percent since 1985. This has necessitated storage of a significant number of items in open areas where they are unprotected from the elements.

Damage to stored material and the deterioration of packing and identification markings cumulatively resulted in materials for the fleet and other supported activities not ready for issue upon demand--a problem which NSC Charleston must overcome to successfully fulfill its mission.

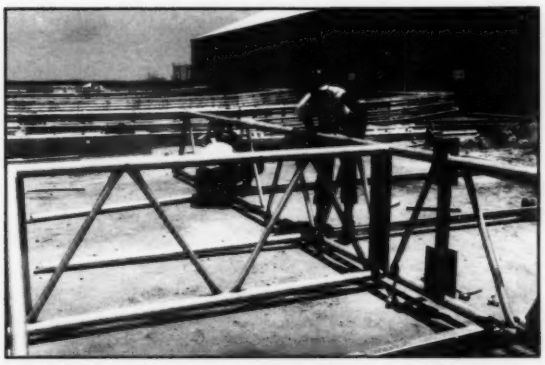
**CONSTRUCTION COST COMPARISON**

| Building Size | Square Footage | TMS Costs | Total Project Costs | Estimated Costs ($60 SF) |
|---|---|---|---|---|
| 66' x 180' | 11,880 | $102.0K | $136.5K | $712.8K |
| 39' x 230' | 8,970 | 87.4K | 135.9K | 538.2K |

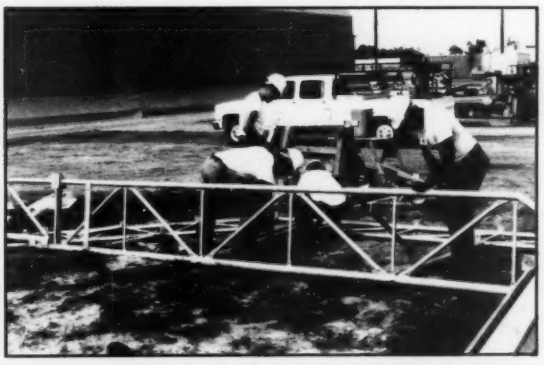
NSC Charleston had taken concentrated efforts to ensure that the items stored outdoors generally were those less seriously affected by exposure to rain and dust; however, the protective packing in which they were stored deteriorated rapidly. This renders them difficult to handle and frequently unsafe. In addition, identification markings are rapidly obliterated by such exposure.

**Site Preparation**

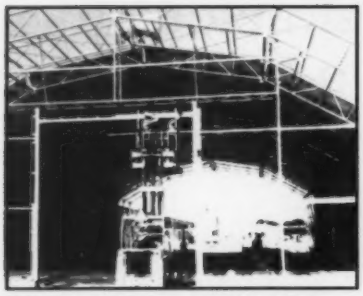
Only a small amount of site preparation was required for each of the buildings. An asphalt pad and a concrete foundation were constructed by a separate contractor prior to the erection of the buildings. The foundation is two feet by four feet poured-in-place reinforced concrete with the anchor bolts pre-set. On a similar building erected



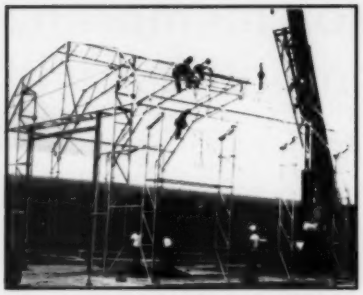
**Seabees from CBU-412 assemble the end gable for the first building. The building trusses are stacked in the center of the building ready for erection.**



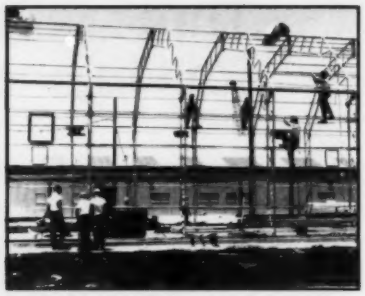
**Naval Supply Center reservists assemble an end gable. A portion of the 66-foot-wide building is in the background.**



NSC reservists and CBU-412 Seabees install wood trim around the roll-up door.



Seabees and contractor technical representatives installed a 39-foot-wide truss and are disconnecting the crane.



Seabees climb the steel trusses to install the purlin. The membrane fabric rolls are prepositioned on top of the structure.

by NSC in October 1987, no site work was required. The foundation for the trusses was an I-beam that was anchored to an existing concrete slab by epoxy resin bolts. The trusses were then bolted to the I-beam.

### The Buildings

Two of the buildings are 66 feet by 180 feet and the third is 39 feet by 230 feet. The buildings are made up of sectional tubular steel trusses. The 66-foot trusses are made up of five sections while the 39-foot trusses are made up of four sections. The covering of the building is a polyester fabric, PVC coated on both sides with a tensile strength of 987 pounds, a tear strength of 223 pounds and a thickness of .031 inch. The membrane fabric is also fire retardant and self-extinguishing and has a 10-year warranty.

The first of these buildings erected in Finland over 21 years ago has never had the membrane fabric replaced. Tubular purlins span between each of the trusses and provide the necessary support for the structure. Also installed between the trusses and from the trusses to the foundation are wire rope cables, critical in meeting the local 122 mile per hour wind load requirement. Mechanical roll-up doors and personnel doors along with louvered vents complete the building materials.

### Building Assembly

The assembly of these structures is really quite simple. The leg sections are laid out with the mid-spans and bolted together. The first truss is assembled on the ground and four or five more trusses are assembled on top of the previous truss, thus creating stacks of five or six trusses. This procedure is repeated for the number of trusses in the building. The stacks are assembled either in the center of the building or on the outside of the foundation depending on the area in which the crane has to operate. The two end bay trusses are considerably more difficult to assemble due to the extra struts and the roll-up door frames that are part of the truss.

*Construction time or each building was about eight days.*

The end bay trusses are assembled and placed on the outside at each end of the building. The 66-foot by 180-foot buildings had 17 trusses and two end bay trusses while the 39-foot by 230-foot building had 22 trusses and two end bay trusses. The time required to assemble all the trusses for each building was approximately two days each.

Once the trusses were assembled, a 40-ton crane was brought onto the site. The weight capacity of the crane is not the critical factor but the amount of boom is. A 90-foot boom was required and all lifts were made with a two-point lift. First an end bay truss was lifted and set on the pre-set anchor bolts. Even when the bolts are not perfectly aligned, the truss is flexible enough to be twisted into position.

This minor twisting of the trusses is not critical in that the tubular purlins and the wire rope cables that are installed later will square up the building. Once the end bay truss was in place it was secured with guy wires tied to concrete blocks. As each remaining truss was lifted into place and bolted down, reservists then climbed the steel and bolted six purlins in key positions on top of the truss.

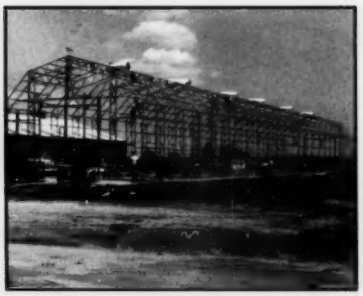
As soon as this was complete, the next truss could be erected, taking approximately a day and a half per building. When all the trusses were erected and the rolls of membrane fabric were set on top of the trusses, the crane was released until the erection procedure began for the next building.

Perhaps the most tedious work for each building was the filling in of the remaining purlins and wire rope cables between the trusses. This work required the climbers to install approximately 400 purlins, axle beams, and frames. The climbers also installed 40 wire rope cables using turnbuckles and shackles. This fill-in work took roughly two days of labor-intensive effort.

While the fill-in work was in progress, the ground crew installed 4-inch by 4-inch pressure-treated wood around the foundation. The 4-inch by 4-inch stock as used to fasten the membrane and seal the building. The vent frames and personnel doors were installed during the fill-in procedure.

After the fill-in work was completed and the wire rope cables tightened, the Seabees climbed to the top of the struc-

**The concrete foundation is ready for trusses. The trusses are being assembled in the middle of the building.**



**A 39-foot by 320-foot building is nearly ready for the fabric to be pulled over the trusses. Seabees are "in the air" installing purlins, and the reservists are installing 4-inch by 4-inch stock around the foundation.**

**The sheets have been pulled into place. Although the sides of the building are grey, the roof is white translucent which negates the need for lights.**

ture and began rolling out the membrane fabric. The fabric rolls stretched out over three or four 10-foot spans depending on the roll. Once rolled out, the sides of the building were stretched down over the trusses.

The fabric was then put into tension by inserting a rod into a sleeve in the fabric and compressing several springs that are connected to the rod and the foundation. After all the rolls of fabric were stretched out over the building and put into tension, the Seabees then laced the sheets together. Dropping the sheets and lacing them together required another day and a half of work.

With all the sheets laced together, the finish work began. The finish work included cutting out the door and vent openings, securing the fabric to the 4-inch by 4-inch stock with screws and installing the roll-up doors and vents. The finish work that completed the building took one day to accomplish.

The construction time for each building took approximately eight days or 945 manhours. It should be noted that whenever there was slack time for the ground crew on a particular building, they went to the next building and began assembling the trusses. The construction of these three buildings was done individually except where overlapping work could take place.

**The Crews**

The work force consisted of four Seabees from CBU-412, 17 reservists on Active Duty for Training (ACDUTRA) from NSC Charleston and two contractor technical representatives from June 6 through 17, 1988. This crew completed one 66-foot building, erected all the trusses and installed about one-half of the purlins for the second 66-foot building. From June 20 through 30, the Seabees, contractor technical representatives, and eight new NSC reservists on ACDUTRA completed the second 66-foot building and completed the 39-foot building. The total manhours expended on this entire project were 2,835.

The expert construction skills of the Seabees and the contractor technical representatives tremendously quickened the learning curve for the NSC reservists. With temperatures constantly over 90 degrees and often close to 100 degrees and 90 percent or higher humidity, the galvanized steel trusses and purlins became extremely hot while laying on the asphalt pavement. The work crew's exemplary performance was undaunted by the arduous conditions. The famed Seabee "Can Do" spirit prevailed and was assimilated by the rest of the work force as all three buildings were completed within the two, two-week reservists' ACDUTRA periods.

**Summary**

Faced with shortage of covered storage space and funding limitations, NSC Charleston utilized the special project program, the self-help program, and the Naval Reserve program to their fullest extent. The diverse group of personnel that comprised the work group was able to blend together into an efficient work force and produce 33,000 square feet of covered storage space that will enhance NSC Charleston's ability to better serve the fleet for many years to come. □

**Three completed tension membrane buildings.**

# More women join CEC work force

**By DR JIM HINZE**
*Associate Professor*
*Department of Civil Engineering*
*University of Washington*
*Seattle, Wash.*

*and*

**LT CONNIE MADDEN, CEC, USN**
*Assistant Resident Officer in Charge of Construction*
*Branch Office*
*Western Division*
*Naval Facilities Engineering Command*
*Silverdale, Wash.*

## INTRODUCTION

An increasing number of women are pursuing careers in the United States Navy. This is exemplified well with the growing numbers of women in the Civil Engineer Corps (CEC). There are currently over 97 women CEC officers which account for six percent of the total number of CEC officers.

Since the Civil Rights Act of 1964 has forbidden job discrimination on the basis of sex, more opportunities have been made available to women. The changing roles of women in the workplace have gained broadened acceptance in the last 20 years. This is also the case with women in the U.S. Navy who are placed in roles traditionally restricted to men.

The matter of increasing the number of women in the workplace may go beyond mere acceptance of women in new roles. The "old roles" were held by men, and governed by rules and regulations that were designed for these men. In many cases these same rules and regulations would apply identically to women who are placed in those roles. However, many of these older regulations no longer apply. Some aspects of the initial regulations of the U.S. Navy were discriminatory in nature.

Examples include differing ages and conditions under which women were enlisted, automatic discharges for women who became pregnant, limits on the number of women who could be enlisted, limits on attainable grades, and different pay scales for men and women in similar positions. These inequities have been virtually eliminated in the U.S. Navy.

Although discriminatory policies have been largely removed from the U.S. Navy, it must be recognized that the needs of women may not always coincide with those of men. This may be particularly true for women who wish to have children or for those who already have children. While child care is also a concern for men, the traditional expectations place a heavier burden of parenting on the mother.

With the growing number of women in the military, the Navy must ask if there are differing needs of these women that must be met. The Navy has already made some distinct changes in its policies to reflect special concerns of women. For example, several changes were made regarding pregnancy in Navy servicewomen.

Pregnant servicewomen are permitted to remain on active duty, maternity uniforms are provided, and pregnant servicewomen are permitted to remain on a ship's crew up to the 20th week of gestation. In fact, the Navy's maternity benefit program is considered to be among the best of major employers in the United States (Money, 1985).

A common concern of working mothers is child care. The Navy sponsors two child care programs. One consists of a referral service whereby the names and addresses of child care services that are provided near naval bases are made available to parents. Some of the larger bases sponsor child care centers themselves.

Other concerns of women in the Navy that may not yet meet with satisfaction include job assignment policies for married personnel, and restrictions on job assignments. Currently, it is the Navy's policy to assign married couples to the same location "whenever possible."

This undoubtedly forces some couples to be separated for extended periods of time. Job restrictions also exist in that women are not to be assigned to positions when they would be directly involved in combat. Nor are women assigned to mobile construction battalions.

## THE STUDY

The U.S. Navy has changed its policies concerning women and will apparently continue to change policies as needs arise. A study was conducted with women CEC officers to identify more specifically the areas needing the greatest attention for modification. The purpose was to identify unique women-related concerns that warrant consideration for future change.

The study was conducted by mailed questionnaires. The questionnaire consisted of two parts. The first focused on the respondent's family and personal life while the remainder addressed issues about the individual's career. A total of 28 questions were developed.

The questionnaire was sent to all women CEC officers, exclusive of those in preparatory schools. Of the 76 women CEC officers who were mailed a questionnaire, 70 responded. With the high response rate (92 percent), the findings can be reasonably construed as indicative of all current women CEC officers.

## THE RESULTS

The results show some interesting characteristics of women CEC officers. Over 75 percent of the respondents have been in the Corps for four years or less. Over 85 percent of these officers have their undergraduate degree in some engineering field with the dominant areas being civil engineering (31 percent) and mechanical engineering (16 percent). Other backgrounds were ocean engineering (10 percent), electrical engineering (6 percent), architec-

ture (9 percent), science (7 percent), and other engineering disciplines (21 percent).

These percentages are different from the Navy's desired apportionment of 50 percent civil engineering, 20 percent mechanical engineering, 20 percent electrical engineering, and 5 percent architecture and 5 percent other engineering discipline (NAVFAC P-1, 1986). Of these women CEC officers, 29 percent have master's degrees (13 percent in civil engineering), 7 percent have professional registration as either architects or engineers, and 76 percent have engineer-in-training registration.

Of the responding officers, 36 (51 percent) are married. Of those, most have husbands who are in the Navy (17 naval officers, 7 CEC officers). Nine of the respondents were mothers, with none having more than two children. The total number of children represented by the respondents is 14, with 13 being under the age of four.

Over 75 percent of the officers indicated that they either had children or that they planned to have children while in the CEC. Some qualified this response on their anticipation of getting married. Interestingly, those planning to have children tended to be those who expected to stay in the Corps for a longer time.

Seven child care centers on four different naval bases were contacted by telephone to gather more information. All but one center indicated that they maintained a waiting list. The waiting time was estimated to be from 1 to 12 months. Additionally, the centers were not open 24 hours a day. Thus, the centers do not cater to personnel who need child care services during overnight duty.

When asked about the Navy's maternity policy, 20 percent rated it as poor and 2 percent (1 respondent) rated it as excellent. Ironically, the respondents with children tended to rate the policy higher than those with children. This may stem from a tendency to rate more negatively on issues with which one is not familiar. However, most of the respondents (63 percent) rate the maternity policy as "good" or "okay."

Several questions were asked about family backgrounds. This information may help develop a profile of women CEC officers. The officers were asked about the number of siblings they had. Over 32 percent of the respondents had four of more siblings while only two had none. This is interesting in light of the fact that in the past 25 years, approximately 18 percent of the children born in the United States have no siblings. Thus, women with siblings appear to be better candidates for careers as CEC officers.

When asked about their parents' occupations, the following responses were obtained. Over 74 percent of the mothers of respondents work outside of the home. The general population of women who were between the ages of 25 and 29 in the 1950s, the estimated ages of the respondents' mothers, the percentages of working women who worked was 40 percent (U.S. Department of Commerce, 1985).

Mothers are strong role models, and surveys show that daughters of working mothers are more likely to work (Chafe, 1972). In fact, there was a strong positive correlation between the responses of officers who have working mothers and the estimated length of time they expect to remain in the Navy.

Over 46 percent of the respondents have fathers who have careers related to the Civil Engineer Corps, as engineers, military officers, or in the construction field. Over half of these respondents indicated that their decision to join the CEC was influenced by their father. In some cases, the decision was influenced by a brother or sister. The nature of the work encountered in the CEC was also mentioned as a prime motivator for choosing a career in the Corps. When asked why they selected construction work, the most common response was "challenging, interesting, satisfying" work (Table 1).

Question: What prompted you to choose construction work?

| Answer | Frequency | Percentage |
|---|---|---|
| Challenging, interesting, satisfying | 32 | 45.8 |
| Use degree | 17 | 24.3 |
| Best offer from Academy, line too limited, CEC scholarship | 11 | 15.7 |
| Enjoy math and science | 5 | 7.1 |
| Do not know, did not answer | 5 | 7.1 |
| Totals | 70 | 100.0 |

**Table 1. The individual's work experience.**

The recruitment efforts of the CEC appear to "pay off" when recruiting women. Over a third of the respondents found out about the CEC through a recruiter while another third of the respondents became acquainted with the CEC in the Naval Academy or an NROTC program (Table 2).

Question: How did you find out about the Civil Engineer Corps?

| Answer | Frequency | Percentage | Cumulative Percentage |
|---|---|---|---|
| Recruiter | 25 | 35.7 | 35.7 |
| Naval Academy | 18 | 25.7 | 61.4 |
| NROTC | 6 | 8.6 | 70.0 |
| Friend | 12 | 17.1 | 87.1 |
| Family member | 6 | 8.6 | 95.7 |
| Advertisement | 2 | 2.9 | 98.6 |
| Did not answer | 1 | 1.4 | 100.0 |
| Totals | 70 | 100.0 | |

Most (70 percent) of the responding women CEC officers entered the CEC through a Navy program--recruiting, Naval Academy, or NROTC.

**Table 2. Learn about the CEC.**

## SEXUAL DISCRIMINATION AND HARASSMENT

One of the principal topic areas in the survey concerned sexual discrimination and harassment. The topic of discrimination was addressed by asking each respondent if she

felt that she had to work harder simply because she is a woman. The questions and the respective questions are shown in Table 3.

Do you feel compelled to try to work harder on the job because you are a woman?

| Often | Occasionally | Rarely | Never |
|---|---|---|---|
| 15 (21.7%) | 30 (43.5%) | 9 (13.0%) | 15 (21.7%) |

Do you feel that you are expected to work harder than your male counterparts in order to "measure up"?

| Often | Occasionally | Rarely | Never |
|---|---|---|---|
| 14 (20.3%) | 22 (31.9%) | 16 (23.2%) | 17 (24.6%) |

**Table 3. Women CEC officers' feelings about having to work harder.**

From the results it appears that 50 to 60 percent of the women CEC officers feel that they must "often" or "occasionally" work harder than their male counterparts. These results are similar to the findings of a study conducted by the Women's Engineering Society (WES) with 130 of its members.

Sixty percent of the respondents to that study felt that "male engineers and nonengineering colleagues are skeptical about the "competence" of women engineers and that women are placed in a more visible position of having "to prove you are competent" (Keenan, 1985).

It has been suggested that the perceptions of women in traditional or stereotypical male roles presents role conflicts. These conflicts result in acceptance problems between women and their male colleagues and supervisors. If these men treat the women differently, it is understandable that these women will feel compelled to work harder in order to meet or exceed the expectations of others (Yoder, 1984).

The above scenario verges on being potentially regarded as sexual harassment. To get a clearer sense of the extent of sexual harassment in the workplace, the survey asked a pointed question on the topic (Table 4). More than 30 percent of the respondents felt that they had experienced harassment often or occasionally.

Have you experienced sexual harassment on the job?

| Often | Occasionally | Rarely | Never |
|---|---|---|---|
| 2 (2.9%) | 19 (27.5%) | 31 (44.32) | 17 (24.6%) |

**Table 4. Women CEC officers' feelings about the prevalence of sexual harassment.**

It is noteworthy that those respondents expressing that they had experienced sexual harassment tended to be those who had been in the CEC for longer periods of time. Possibly these officers with greater tenure experienced more harassment because they were the first women to become CEC officers; i.e., the acceptance of the first women officers by the male personnel was probably more difficult than for more recently enlisted officers.

In addition to describing their experiences regarding sexual harassment, the respondents were asked which parties were inclined to treat them differently. In particular, the CEC officers were asked about their experiences with co-workers, supervisors, and clients. Of these, the parties that most often treated them differently were co-workers (60 percent), followed by clients (55 percent), and supervisors (29 percent).

It should be noted, however, that being "treated differently" may not always imply sexual harassment. The respondents appeared to be harassed by co-workers in some instances as they indicated that men were "insecure," "felt threatened," "had bad attitudes toward women," or "feel that I do not know anything." Others commented they received more attention but that this was not necessarily negative.

It is possible that being a woman is an advantage in some instances. For example, a woman may stand out in a group of men and, as a result, her performance will receive greater visibility (Keown, 1985). Of course, this could also be a disadvantage in some cases. For example, some responding CEC officers indicated that because they are women their superiors give them extra duties such as "planning social functions or luncheons."

This is counter to Navy policy as women are not to be "assigned additional or collateral duties based on sex" (Card, 1982). Unique comments regarding their experiences with clients, particularly contractors, included "they do not think I know anything," "they do not take me seriously," "they try to take advantage of me," and "they try to work around me."

Others stated that they receive less respect, they feel they must "prove" themselves, and the "men in foreign countries are very prejudiced." It is noteworthy that supervisors were evaluated as treating the women CEC officers differently much less than the clients, namely the contractors. This may stem from the extensive training offered in the Navy on harassment. This would indicate that the training is effective.

The survey asked respondents to estimate how long they will be in the Navy. The responses are provided in Table 5. Some respondents clearly intend to make a lifetime career in the Navy while others regard it as a temporary obligation. However, a large percentage (over 50 percent) feel that the commitment will be more than five years. These results are consistent with other data that indicates that of all CEC

Question: How long do you feel you will be in the Navy?

| Response | Frequency |
|---|---|
| Do not know | 6 ( 8.6%) |
| 5 years or less | 27 (38.6%) |
| 6 to 15 years | 21 (30.0%) |
| 20 years or more | 16 (22.8%) |

**Table 5. Expected length of naval career.**

officers (men and women), 36 percent resign within five years (Moore, 1986).

By correlating the responses to this question with other responses it is clear that those women who experienced, or sense that they experienced, more harassment on the job will stay in the Navy for a shorter period of time.

The women officers were asked if they would prefer to have more women in the Navy as their supervisors or as co-workers. Over 75 percent of the respondents stated that "it does not matter." Approximately 19 percent stated that they preferred a male supervisor while none stated that they would prefer a female one.

When asked major problems that they had encountered on the job, a variety of answers were given (Table 6). Note that two women stated they were "denied a billet because a command did not want a woman," a discriminatory action in violation of the Navy's policy of Equal Employment Opportunity.

Question: Would you describe the major problems you have encountered on the job simply because you are a woman?

| Answer | Frequency | Percentage |
|---|---|---|
| No major problems | 23 | 33.8 |
| Credibility/prove self | 20 | 29.5 |
| Need construction field experience before going to a construction job | 7 | 10.3 |
| I am treated as a woman rather than a professional | 6 | 8.8 |
| Not allowed to serve with the Seabees will hurt promotion opportunities | 4 | 5.6 |
| Contractors try to make women look bad whenever possible | 4 | 5.9 |
| I was denied a billet because a command did not want a woman | 2 | 2.9 |
| Too hard to have children and pursue a career in the CEC | 2 | 2.9 |
| Totals | 68 | 100.0 |

**Table 6. Major problems.**

Another question asked about changes that the respondents felt should be made in the CEC. The responses are interesting (Table 7). An overwhelming majority of the women officers feel that the Seabees should be opened up to women. Other comments of interest are that maternity leaves should be longer and that the detailing policy for married couples should be altered.

Question: If you could change a Navy policy to make working in the Civil Engineer Corps more rewarding or better for women, what would it be?

| Answer | Frequency | Percentage |
|---|---|---|
| Open up the Seabees to women | 44 | 64.7 |
| No changes necessary | 9 | 13.4 |
| Maternity policy, need more time | 5 | 7.4 |
| More women in key billets, no "women" billets | 4 | 5.8 |
| Detailing policy for married couples | 2 | 2.9 |
| Other | 4 | 5.8 |
| Totals | 68 | 100.0 |

**Table 7. Changes.**

## CONCLUSION

The findings of this study focus on a variety of concerns that must be addressed by most employers. Women are being integrated into work forces in all industries. While the findings that women CEC officers would like to be able to be assigned to a Seabee billet may be unique to the Navy, other concerns are of a general nature. It is interesting that retention of women appears to be related to the degree to which they experience harassment.

The concerns voiced about maternity leaves must be addressed for any pregnant employee. Although the child care services in the Navy do not appear to be considered deficient by the CEC officers, that may not be the case for other employers. In fact, the Navy program for child care may serve as a model for other employers.

In general, it appears that some sexual discrimination and harassment still exists in some areas of the Navy. However, the problems do not appear to be severe. The Navy apparently has a reasonably effective training program on harassment as evidenced by the disparity of experiences of harassment from superiors and contractors; thus, the training program of the Navy may also serve as a guide for other employers. □

**NAVY CIVIL Engineer**

*Have you noticed our new look?* This issue is our first try with desktop publishing.

We use Pagemaker 3.0 desktop publishing software for our page layout and design on a Zenith Z-248 with extra memory, Multimate Advantage II word processing software to prepare and import articles into Pagemaker, Hewlett-Packard Laserjet Series II laser printer and scanner, Readright optical character recognition software, and Publisher's Paintbrush graphics software.

We can also convert articles from other PC-compatible word processing software, so you can now send your articles on disk to our editorial offices, and we'll return your disk to you after your article has been processed.

# CHESDIV progresses in its role of ocean engineering and construction

By CDR A. M. PARISI, CEC, USN
*P.E., Va.*
*Head, Ocean Engineering and Construction Project Office*
*Chesapeake Division*
*Naval Facilities Engineering Command*
*Washington, D.C.*

Ocean engineering and construction--a phrase that probably raises several questions. What is it? Why and how is the Naval Facilities Engineering Command (NAVFAC) involved? The purpose of this article is to help identify ocean engineering problems and to tell you where to go for help.

Ocean engineering is the application of classical engineering disciplines in the ocean environment. All the theories, equations and formulas of civil, mechanical, and other engineering disciplines are identical whether they are applied on land or in the ocean. Application of those principles in the dynamic ocean environment is the key challenge of ocean engineering. Construction in the offshore environment is equally challenging. Here again, the principles are similar but the tools and techniques are quite different.

The major difference between ocean engineering and construction projects and their terrestrial counterparts is the element of risk. There are certainly high-risk terrestrial facilities, but most are relatively low risk. Most ocean facilities projects are high-risk, high-tech projects. Risk assessment becomes a significant factor in the design, construction, and acquisition process. Failure to adequately address and assess risk can turn an ocean construction project into a very expensive salvage project. Unfortunately, there are many examples.

The Navy owns and operates a number of offshore platforms and undersea cables, pipelines, moorings, and sensors. The NAVFAC mission for these ocean facilities is identical to that for terrestrial facilities. NAVFAC executes its mission for planning, acquiring, and supporting the activities and claimants in the maintenance of ocean facilities through the Chesapeake Division (CHESDIV).

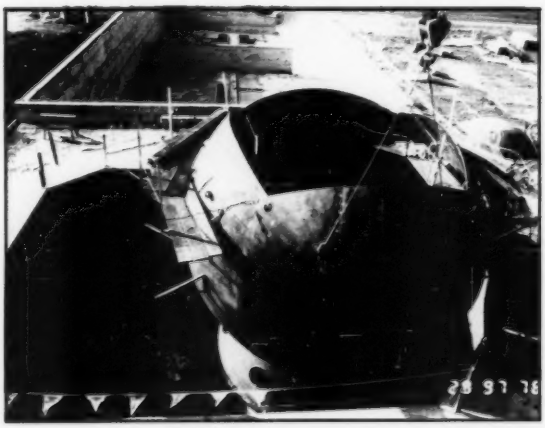
In addition to its normal geographic mission, CHESDIV has worldwide responsibility for ocean facilities. The Ocean Engineering and Construction Project Office (FPO-1), a CHESDIV department, has a staff of approximately 65 civilian and military personnel with specialized education, knowledge, and experience in the design, construction, maintenance, and repair of ocean facilities.

Many are engineers with undergraduate and advanced degrees in ocean engineering, and there are a number of technicians and marine specialists with a tremendous amount of experience working in the ocean. Some are also Navy-qualified divers. There are also important support personnel (secretaries, contract specialists, analysts, etc.) without whom an organization could not function.

In addition to its ocean engineering mission FPO-1 designs, constructs, and provides maintenance support of shore-based hyperbaric facilities. These facilities are used in support of diver training, treatment of diving-related illnesses, and medical treatment of nondiving illnesses. Projects range from standard diver recompression chambers to sophisticated and complex saturation diving systems.

Current examples include recompression chambers at Kaneohe, Hawaii; Roosevelt Roads, Puerto Rico, and Macrihanish, Scotland; an escape training facility at Groton, Conn.; and facilities to support swimmer delivery vehicle training and maintenance for the special warfare community.

There has been a growing use of hyperbaric facilities for treatment of a variety of nondiving illnesses such as gas gangrene, carbon monoxide poisoning and burns. There are documented cases where hyperbaric medical treatment has produced remarkable results. A large hyperbaric medical treatment facility is currently under construction at Travis Air Force Base,



**Travis Air Force Base hyperbaric medical treatment facility under construction. The sphere is 23 feet in diameter.**

Calif., as part of the hospital replacement project. The officer in charge of construction at Travis designed and is constructing the hospital, and CHESDIV is the agent for the $10 million hyperbaric facility.

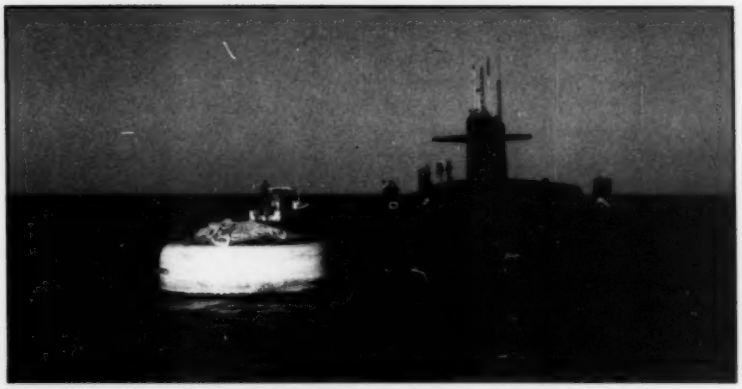
Adequate maintenance of hyperbaric facilities is critical and often local activities do not have the necessary expertise. FPO-1 provides the facilities management support in much the same way as any field division 09B. For some facilities, major overhauls similar to ship overhauls are programmed and executed. Such is the case at the Naval Diving and Salvage Training Center, Panama City, Fla., where FPO-1 is completing the second regular overhaul of the Center's hyperbaric facilities. Testing all systems to ensure the facility operates as originally designed is one major objective of these projects. Repairs are made to correct deficiencies thereby reducing the maintenance and downtime and maximizing training availability.

CHESDIV FPO-1 designs and installs specialized moorings and manages the NAVFAC Fleet Mooring Maintenance Program. The Fleet Mooring Maintenance Program integrates and coordinates a global effort for the inspection, maintenance, overhaul, and installation of moorings and provides criteria to accomplish this work.

***In addition to its normal geographic mission, CHESDIV has worldwide responsibility for ocean facilities.***

Many moorings are used on a temporary basis and standard designs are available in the Mooring Design Manual (DM-26). When a specialized design is required, such as a mooring which must survive during a hurricane or typhoon or the bottom conditions prevent the use of conventional anchors, FPO-1's unique design and installation expertise is necessary.

For example, when cost estimates for conventional solutions to berthing a training ship next to a pier far exceeded the project budget, FPO-1 was asked to assist. Because the ship had an active nuclear power plant but could not get underway, the design requirements were extremely stringent. FPO-1 designed a mooring that met all the requirements and could be built within the available funds.



**Submarine approaches CHESDIV-installed mooring in St. Croix U.S. Virgin Islands.**

At some sites the bottom consists of hard material, such as coral, that prevents the use of drag-type anchors. In such cases, propellant embedment anchors (PEAs) are used. PEAs use a propellant charge to push an anchor deep within the seafloor. FPO-1 maintains the special expertise and equipment for preparing and installing PEAs.

FPO-1 has developed upgraded moorings with innovations like higher grade chain, replaceable chain-link zinc anodes for cathodic protection and foam buoys. These improvements increase the design life of a mooring from 5 to 15 years. Together with new high-efficiency anchors developed by the Naval Civil Engineering Laboratory, the upgraded moorings are a vast improvement over existing ones.

The Navy operates a variety of underwater ranges--instrumented areas of the seafloor--for airborne, surface, and subsurface training and testing. FPO-1 plays a vital role in the planning, design, installation, and repair services that are required to establish and maintain these ranges. There are two major types of ranges: acoustic and magnetic.

Acoustic ranges consist of arrays of hydrophones which transmit data, via cables, to shore-based processing equipment. Ships, submarines, weapons, and simulated targets are tracked in real time during antisubmarine warfare (ASW) exercises on training ranges. This type of training is vital to ASW readiness.

Other ranges measure the noise generated by these vessels. This data is used to design quieter vessels to minimize the risk of detection and for weapons development. FPO-1 has installed and repaired acoustic ranges in St. Croix, Southern California, the Bahamas, and Hawaii.

Magnetic, or degaussing, ranges are used to measure the distortion of the earth's magnetic field caused by ships and submarines. This distortion is referred to as the magnetic signature of the vessel. The signature is critical if the ship is to avoid magnetic homing mines and torpedoes or, in the case of submarines, detection.

A degaussing range consists of a row of sensors in a channel over which a vessel passes to measure its signature. If the magnetic signature becomes too large, it is decreased using on-board electronic equipment.

If the signature is larger than the on-board equipment can handle or the vessel has no equipment, it must be treated in a deperming facility. To accomplish this, the vessel is wrapped in large electrical conductors which are energized to decrease the vessel's signature.

CHESDIV FPO-1 performs a variety of tasks to ensure that the sensors and cables for all types of ranges are properly designed and installed. FPO-1 has pioneered techniques of ocean construction involving the placement of these sensors on the seafloor within precise bands of tolerance.

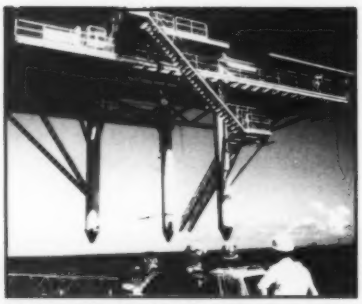
FPO-1 also designs, installs, stabilizes, and protects other near-shore and deep-sea cables for power, communication, and data transmission.

FPO-1 is currently planning for the design, procurement, and installation of a fiber optic communication cable from Okinawa to Sasebo, Japan, to Korea. This 700-mile cable will dramatically improve defense communications in that part of the world.

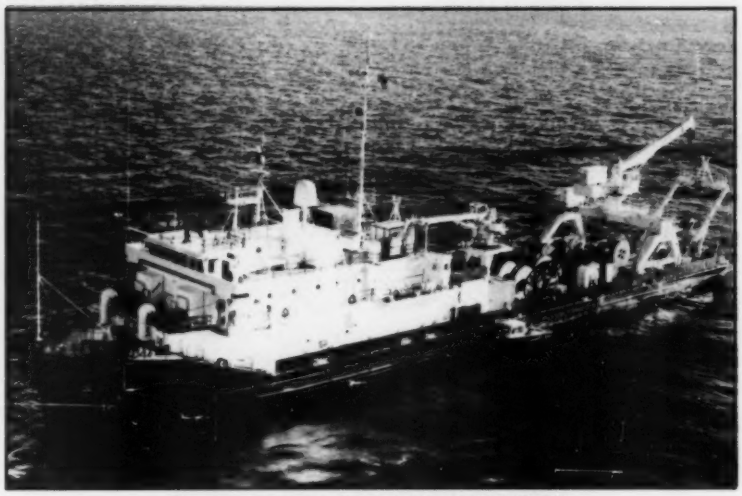
The Navy has over 1,800 waterfront facilities at over 160 activities throughout the world. There are over 100 miles of berthing space at piers and wharves. In addition, bulkheads and quay walls total over 140 miles in length. The waterfront facilities inspection program, conducted by CHESDIV, provides for periodic underwater inspections of these facilities to assess the integrity of the structures, make recommendation for maintenance and repair, and provide cost estimates for maintenance and repair.

The program is part of the NAVFAC Specialized Inspection Program and its main objectives are to supplement the normal facilities inspection conducted by activities and inspect all Navy waterfront facilities. During the first eight years of the program (Fiscal Years 1980 through 1987) 46 percent of the Navy's facilities were inspected at least once and many have had subsequent inspections. CHESDIV also performs underwater quality assurance inspections for new construction and repairs of waterfront facilities.

CHESDIV FPO-1 designs, analyzes, installs, and repairs a variety of ocean structures, including off-shore towers. These towers are used to support equipment for tactical aircrew combat training systems (TACTS), a vital part of fighter pilot training for the Navy, Marine Corps, and Air Force. The Navy has one operational offshore TACTS range off Kitty Hawk, N.C.



**Three hundred-fifty ton deck section of Charleston tactical aircrew combat training system (CTACTS) being lifted for placement.**



**Ocean construction platform SEACON.**

FPO-1 is currently repairing hurricane damage to the towers and planning for the expansion of that range. Towers for the Charleston TACTS were recently constructed and that range is scheduled to become operational in 1989 upon installation of associated electronic equipment by the Naval Air Systems Command.

Underwater pipelines for POL, water, and sewage represent another area of FPO-1's expertise. FPO-1 has developed and installed unique designs such as flexible pipelines to ease installation and reduce cost. The capability to design, construct, inspect, and repair underwater pipelines of all types exists within FPO-1.

CHESDIV executes the wide range of ocean and hyperbaric projects in a number of different ways. Because of the high-risk, high-tech nature of this work, negotiated contracts are the preferred acquisition method. In some cases, the two fleet Underwater Construction Teams (UCT ONE at Little Creek, Va., and UCT TWO at Port Hueneme, Calif.) perform the work.

On the recent installation of the underwater range in Southern California, people from UCT TWO, Naval Mobile Construction Battalion SEVENTY-FOUR, several contractors, other Navy activities, and FPO-1 made up the construction force. FPO-1 has successfully managed many projects involving multiple construction organizations.

CHESDIV maintains an inventory of specialized ocean construction equipment. The Ocean Construction Equipment Inventory (OCEI) includes such items as cranes, winches, navigation systems, electronic test equipment, cable-handling machinery, specialized diver tools, and the Ocean Construction Platform SEACON. The OCEI is based at Portsmouth, Va. Items of the OCEI are available for use by other organizations through formal loan agreements.

SEACON is a seagoing vessel 260 feet long with a beam of 48 feet. It accommodates up to 50 people. SEACON is specially configured for ocean work and has dynamic positioning capability, sophisticated navigation systems, center well, and on-board cranes. It is capable of conducting sustained, at-sea operations for a variety of tasks.

NAVFAC ocean engineering and construction is exciting and challenging. Many projects require the use of the latest state of the art analysis, equipment fabrication, and construction techniques. But the most important part is that these projects provide direct support to the fleet, and that is what we're all here for. The Navy has an investment of well over $10 billion in ocean, hyperbaric, and waterfront facilities. CHESDIV can help with planning, design, construction, repair, maintenance, and inspection of those facilities but only if someone asks for help. If you have a problem or question in any of the areas described, contact CHESDIV FPO-1 at Autovon 288-5365 or (202) 433-5365. □

# SW1 Thomas W. Kaylor, USN

**20th Naval Construction Regiment**
**Naval Construction Battalion Center**
**Gulfport, Miss.**

**Petty Officer First Class Thomas Kaylor joined the 20th** Naval Construction Regiment (NCR) on April 25, 1985, as the phase director for war damage repair. His specialty is the instruction of homeported Naval Mobile Construction Battalions in the various forms of rapid runway repair.

The steelworker is a native of Fairfax, Va., and joined the Navy in 1979. After completing boot camp and "A" school, he served at Naval Weapons Storage Facility, Boardman, Ore., and then with Naval Mobile Construction Battalion 74.

Kaylor has helped develop lesson guides and instructional programs for several repair methods including fiberglass reinforced paneling; precast concrete panels; rapid-set Portland cement, concrete, and AM-2 matting.

He was a major contributor to the first Navy rapid runway repair conference held recently in Gulfport. Specifically he coordinated a demonstration of RSPC to patch a 35-foot simulated crater.

Petty Officer Kaylor and his wife, Connie, reside in Gulfport with their two-year-old son, Matthew.

**The 20th Naval Construction Regiment was recommis-** sioned April 17, 1966, at the Naval Construction Battalion Center, Gulfport, nearly two decades after its origin in World War II. The Regiment was re-established to support the build-up of the Naval Construction Force incidental to the United States' involvement in Vietnam.

The mission of the 20th NCR is to support and exercise operational control over Naval Mobile Construction Battalions 1, 7, 62, 74, and 133, homeported at Gulfport. This regimental support includes providing military training and coordinating special Seabee and technical training to assist the battalions in becoming completely self-sufficient units capable of deploying and accomplishing a mission anywhere in the world. The 20th NCR receives, processes, and trains new personnel in transit to battalions deployed away from homeport and receives personnel from the battalions for processing for release from active duty or reassignment to new duty stations.

Another part of the 20th NCR's mission is the training support of the Reserve Naval Construction Force. Eight Reserve Naval Construction Regiments and 17 Reserve Naval Mobile Construction Battalions train annually at CBC Gulfport or elsewhere within the continental United States. These units get the same technical and military training as the active battalions.

Civic Action Teams, sometimes called "the Navy's Peace Corps," are 13-man teams made up of highly skilled battalion personnel who are assigned to the 20th NCR to be cross-trained to function as a completely independent specialized construction unit. The teams are deployed to remote areas to accomplish construction tasks while teaching construction skills to the local people. By building, teaching, and making friends, Civic Action Teams are one of America's most important assets overseas.

**By MARY KAY GOMINGER**
*Public Affairs Office*
*Naval Construction Battalion Center*
*Gulfport, Miss.*

# Mobile 'fast' labs support Navy medical research programs

**By LT ANTHONY J. COX, CEC, USNR**
*E.I.T., S.C.*
*Instructor, Facilities Management Division*
*Naval School, Civil Engineer Corps Officers*
*Port Hueneme, Calif.*

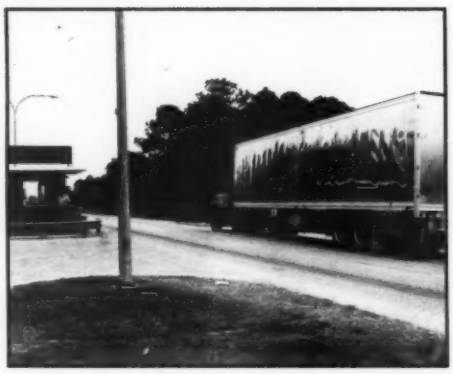
The morning of the final inspection had arrived at last. The assistant resident officer in charge of construction (AROICC) and the construction representative "walked" the job site with the customer and contractor, checking contract completion. The walls were up, the air conditioning and plumbing were in, the power and lights all worked, the carpet was laid, and all the finish work was in place. Satisfied that the construction was complete, everyone filed outside. The doors were closed and locked, and as the customer stood admiring his new facility, away it went down the road at 55 miles per hour!

Actually, the customer was quite pleased to see this. The "customer" was the Naval Aerospace Medical Research Laboratory (NAMRL) at the Naval Air Station, Pensacola, Florida.

The officer in charge of construction (OICC) Pensacola had just delivered the last of three Mobile Field Laboratories--specially constructed commercial van semi-trailers to be used as Mobile Medical Research Laboratories. The delivery date marked the culmination of a fast-track mission development plan for NAMRL.

### Aviation Medical Research Mission

The Mobile Field Laboratories (MFLs) will provide data-gathering capability for two research programs. The original program for which the MFL concept was developed was the Naval Aviation Selection Standards Program. Physiological and cognitive performance such as balance, orientation, hearing, reaction time, and cardiopulmonary fitness are important capabilities for pilot and flight officers operating today's complicated aircraft.



**Vestibular unit is delivered to Naval Air Station Pensacola, Fla. (All photos by B. Barrett, NAMRL.)**

The pilot must perceive and react to a myriad of situations during flight, and every aspect of performance is critical. "From observations of pilot performance in the field, we can theorize causes or factors which help make up this performance," explained Dr. James D. Grissett, Head of the NAMRL Medical Sciences Department.

"Our objective is to correlate these observations with data obtained through various laboratory test batteries. The MFL provides us with a means to run these tests on subjects right out at the airfield during a normal day of flight operations. This yields more accurate results while minimizing interruptions to squadron flight operations. The results obtained will lead to more accurate, measurable performance indicators which should help the flight surgeon make a judgement on the Naval Aviator's physical readiness for flight."

### Chemical Warfare Effects

The second program is a tri-service effort, jointly sponsored by the Army, Navy, and Air Force. Interested in combating the deadly threat of chemical warfare, the military has developed "pretreatment" drugs to reduce the effects of chemical warfare agents on our forces. Pretreatment drugs, however, may have minor physiological side effects which could affect troop performance of various field operations.

According to Dr. Grissett, "Using the same scientific approach as the Aviation Standards Program, we can obtain data which can be correlated with observed performance in the field. The MFL can be brought out to the field and set up during a military operational exercise.

"The subjects are then given the pretreatment drugs and their performance is measured on the test batteries and then again on a particular operational exercise task. Our comparison will allow the development of criteria to predict the effects of the drugs on different operational tasks. The results we obtain will allow unit commanders to revise their time and performance estimates during mission planning to allow for effects of the drugs on their operations."

### Construction

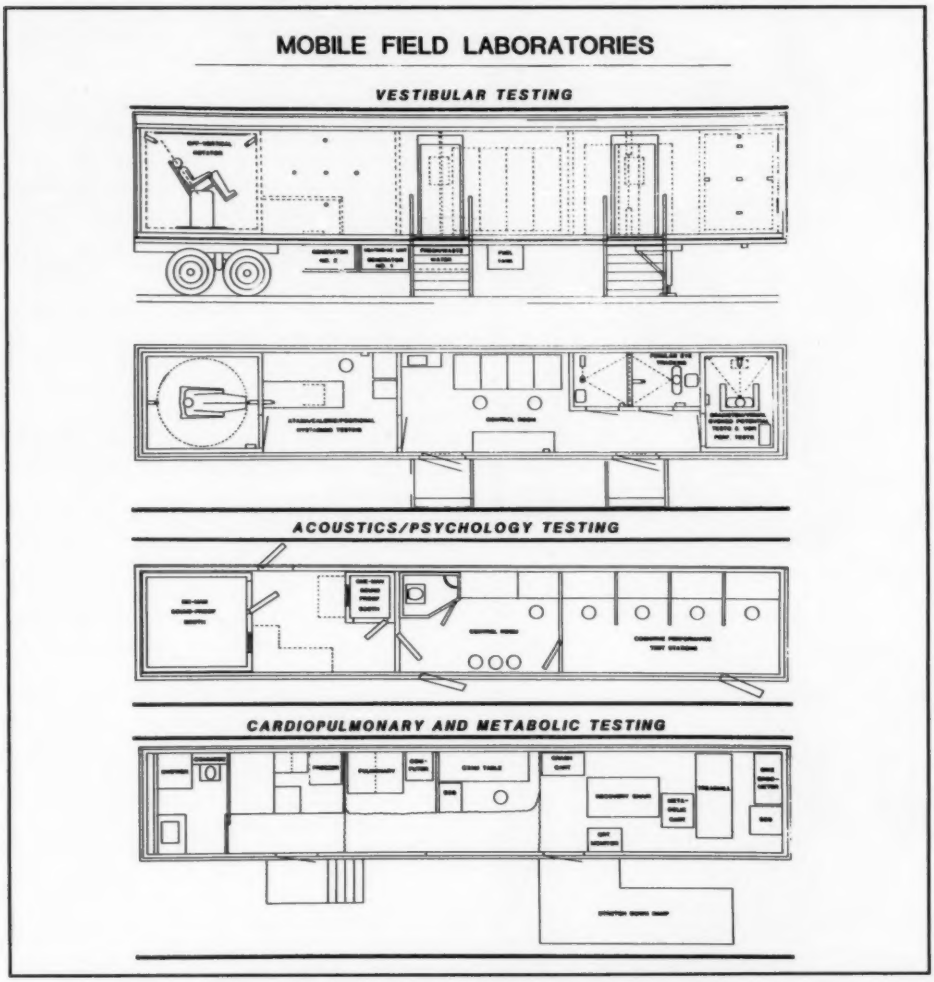
Although the dual research mission of the MFLs is important, available program funding was extremely limited. Because of the amounts involved and time limitations on expected funds, NAMRL requested the services of the Navy Public Works Center (PWC), Pensacola.

Although this type of acquisition is normally handled by other types of procurement, it was decided that acquisition would be by formally advertised construction contract, under the PWC commanding officer's delegated authority as the OICC Pensacola.

The MFLs were designed as standard-type van semi-trailers, but were specially constructed to Navy weight and dimension requirements. In order to transport without special permits, however, these requirements could not exceed Department of Transportation (DOT) specifications.

Three different units were required--one for vestibular (the area of the inner ear dealing with balance and orientation) testing, one for acoustical and psychological testing, and one for cardiopulmonary and metabolic stress testing.

NAMRL had previously retrofit two trailers as vision testing units, but the new testing labs re-

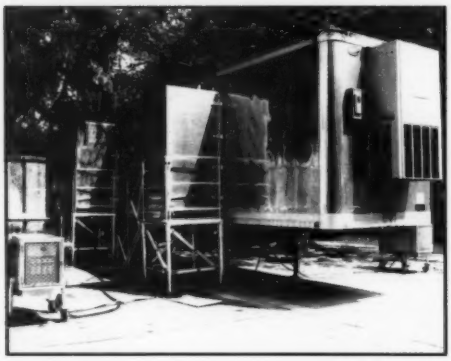



**Preliminary Mobile Fast Laboratory unit floor plans.**

quired delicate instrumentation and a controlled environment. Since an airfield apron or a battlefield can be a noisy place, each unit was insulated with sound-dampening foam, then lined with four- to eight-inch thickness of acoustical paneling, similar to that found in a sound booth.

The heavy heat load due to hot airfield locations and operation of large computers is handled by ducted central air-conditioning units and a natural reflectorized aluminum trailer skin. Each unit is self-contained, with power provided by two 15-kilowatt diesel generators and transformers--one for power, lighting, and air conditioning, and the other a regulated power source for computers and equipment.

**Construction testing included measuring sound attentuation of an operating jet engine.**



**Deployed Mobile Field Laboratory, showing dual system generators.**

**NAMRL's Mobile Field Laboratory "Convoy," including two previously retrofit vision testing units.**

A water supply system and wastewater collection system are also installed, complete with hot water, shower, and head facilities. Once it arrives at a testing site, each trailer can be precisely leveled with four independently operating built-in jacks, the generators and stair landing sets can be removed from storage beneath the trailer, and everything set up within 30 minutes, ready for operation. Design dimensions even allow transportation aboard C-5 aircraft to anywhere in the world!

With funds exhausted after contract award, there were no follow-on consultation services available from the design architect-engineer. This posed a special challenge for the OICC Pensacola not experienced in construction of transportation equipment.

During construction at the contractor's plant, numerous field problems and an intense contractor submittal review process were handled successfully by the "building team," consisting of the Navy PWC engineering department, the project manager, and the OICC construction representative.

The research staff at the Naval Aerospace Medical Research Laboratory who were tasked with operation of the completed labs also provided vital input to the team approach, enabling the OICC to tailor the finished product to meet their requirements.

Once construction was completed, the units were subjected to detailed testing. Road testing consisted of rough terrain travel, tracking ability at highway speeds, and safe emergency stops from 55 miles per hour, with no observable damage to exterior or interior components. Each unit was then parked 25 yards away from a jet engine test cell operating at full capacity and acoustical levels were measured inside the unit. All was quiet!

Finally, a complete power and operational system checkout was performed by the contractor and complete mobilization and demobilization procedures observed. The units were delivered in March 1987 and, as of this writing, installation of testing instruments was nearing completion.

The completed NAMRL Mobile Field Laboratory "Convoy" gives the Navy the opportunity to conduct sophisticated performance research right where the action is, and NAMRL Pensacola is now home to three of the U.S. Navy's fastest laboratories!

□

# Do contractors have the right to finish early?

By LCDR STEVEN B. HINCHMAN, CEC, USN
*P.E., Calif.*
*Operations Officer*
*Naval Mobile Construction Battalion THREE*
*Naval Construction Battalion Center*
*Port Hueneme, Calif.*

Throughout NAVFAC, it is agreed that contractors have the right to finish firm fixed priced construction contracts early. However, many resident officers in charge of construction (ROICC) offices require contractors to submit construction schedules which show an anticipated completion date coinciding exactly with the contract completion date. This is required regardless of how reasonable, logical, feasible, and attainable the contractor's original proposed early completion schedule might be. This is done because it eliminates exposure to extended overhead claims for government-caused delays for the period of time between the contractor's early scheduled completion and the completion date established by the terms of the basic contract.

This line of reasoning is *absolutely incorrect*. The Federal Courts and the Armed Services Board of Contract Appeals consistently rule in favor of contractors in these cases.

In 1963, the United States Court of Claims, in Metropolitan Paving Company vs. United States, first addressed the question of whether the contractor can recover damages when the delay had not extended the contract performance beyond the specified contract time. The court noted, that although the government did not have an obligation to aid the contractor to finish early, hindering or preventing an early completion could create liability. Interestingly, the Court went further by stating that it made little difference whether the parties contemplated an early completion, or even whether the contractor contemplated an early completion.

The Armed Services Board of Contract Appeals has heard many cases involving early completion delay claims. In the 1977 ASBCA case called Sydney Construction Company, the Board allowed for recovery of an early completion claim. The contractor proved to the Board's satisfaction that the work could have been completed earlier than it actually was, *but for* the government's delay. In this case, although the actual completion date occurred 35 days earlier than the contract completion date, the Board awarded the contractor 75 days of delay damages for the period of time the contractor was delayed by acts of the government.

In a 1979 ASBCA case involving Owen L. Schwan Construction Company, the contractor was allowed to recover costs associated with delay caused by the government, despite the fact that he finished 70 days before the date specified in the contract. In this decision, the Board established the basic test for a contractor's early finished claim. They are:

1. The contractor must communicate to the government an intention to complete early.

2. The initial schedule indicating an early finish must be feasible and attainable.

3. Government actions or inactions must prevent the contractor from completing early.

In a following ASBCA decision, Dynal Associates, the Board noted that the government does not have to be aware of the contractor's plan for early completion, but only whether the early completion schedule was attainable.

Also, in a 1982 ASBCA case involving BECO Corporation, the Board again upheld the contractor's delay claim, even though the contractor completed its within the original contract period.

These cases clearly indicate that the United States Claims Court and the Armed Services Board of Contract Appeals, the two sources to which a contractor can appeal a contracting officer's final decision, recognize the contractor's right to recover delay costs measured from the contractor's early finish date, given the existence of a realistic schedule for completion.

The contractor must, however, be able to establish that the early finish schedule was not fabricated after the fact only to support the contractor's early completion allegations. The bottom line to all of this is that if the government causes a contractor to remain on site longer than he would have been but for the government-caused delays and the contractor incurs extra cost for being there longer, then we pay.

It does not matter where in the construction schedule that these government-caused delays occur, whether it's before contract completion date, at contract completion date, or after contract completion date.

When we force a contractor to submit to us a schedule which shows his or her planned completion to coincide with the actual contract completion date specified in the terms of the contract, it does nothing to diminish our exposure to extended overhead. □

# Obtaining quality service through facilities support contracts

**By BARBARA S. McCOY**
*Director, Facilities Support Contracts Department*
*Naval Facilities Contracts Training Center*
*Port Hueneme, Calif.*

Facilities support contracts (FSCs) are contracts through which the Naval Facilities Engineering Command (NAVFAC) accomplishes the repair or maintenance of real property facilities, vehicles, or equipment, and/or performance of required services for the preservation of facilities. FSCs are an extension of the activity's in-house capability; when resultant of an OMB Circular A-76 Commercial Activities Study they replace the in-house work force.

FSCs are enjoying a rapid growth within NAVFAC. In Fiscal Year (FY) 1980, the dollar volume of FSCs was approximately $200 million; in FY 1986, $725 million; and it is projected that by FY 1990 there will be approximately $1 billion invested in FSCs.

The two types of FSCs are service (i.e., janitorial, grounds maintenance, geothermal power development, computer-aided design), and construction (i.e., painting, paving, dredging, street repair). FSC construction is distinguished from pure construction by two characteristics: (1) the contract must be "indefinite delivery" in type, and (2) the requirement must be recurring in nature. These two types of contracts, FSC service and FSC construction, may be issued as stand-alone contracts, or may be combined into a single contract in certain circumstances and with appropriate approval.

The rapid growth of FSCs can be directly compared to the rapid growth in the service world. Airlines, car rentals, grounds service, equipment leasing/repair, janitorial services, and professional services illustrate the industry's concern for the quality and timeliness of the services received. How many of us have arrived on time at an airport only to be told that the flight has been delayed or even cancelled? How many of us have purchased a new automobile under the impression that we have purchased a quality product, only to return it numerous times to the shop exercising the warranty?

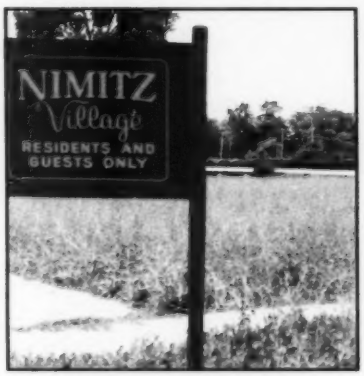
Historically speaking, the biggest problem in FSCs has been receiving quality services. The facility support service contracts include a "schedule of deductions" which is a bilateral agreement of monies to be deducted from the contractor's invoice for unsatisfactory service and/or services not received. This satisfies the need for not paying for services not received, however, it does not solve the problem of receiving the service or receiving satisfactory service. NAVFAC's willingness to attempt various methods to obtain quality services began with the fixed price incentive fee (FPIF) contract which motivated the contractor to reduce costs. Although this type of contract did result in reduced costs, it did not provide the receipt of quality services.

NAVFAC needed a type of contract which would motivate contractors toward quality service. The FPIF contracts, which are generally used for large multi-function base operating support services, are being replaced by the fixed price award fee (FPAF) contract, which motivates quality, timeliness, cost efficiency, and cooperation from the contractor.

The methodology of the award fee is set forth in the contract. The total amount available for the award fee is stated, as well as the fact that it will be awarded quarterly based upon performance exhibited the previous quarter. The award fee determination is not subject to the "disputes" clause. The maximum amount available of any evaluation period is one-fourth of the total annual award fee, and any amount not awarded in an evaluation period will not be carried over to the next quarter.

The performance criteria and weighting are also stated in the contract; i.e., quality of work, contractor response to service calls, timely completion, required reports, cost control of subcontracted work, and cooperation and ingenuity. With the inclusion of "cooperation and ingenuity" as a performance criteria, the all-too-often adversarial relationship between the contractor and the government is essentially eliminated.

Naval Air Station (NAS) Whiting Field, Fla., is administering a FPAF multi-function contract. The award fee available for each evaluation period is



**Services not received.**

**Unsatisfactory service.**

$75,000. In the award fee periods, the contractor earned 90 percent of the award fee for one period, 95 percent for two periods, and 100 percent for three periods. A comparison was performed of the previous FPIF contract and the current FPAF contract. A $400,000 savings was realized for the first year of the contract, and a savings of $375,500 the first option year. In addition to the savings, NAVFAC is receiving quality service. There are presently 10 FPAF contracts in existence within NAVFAC.

In order to illustrate NAVFAC's commitment to receiving quality service, Random Sampling Extrapolated Deductions V3.1 (RSED) is currently being utilized as a method of surveillance available to any activity. This surveillance method is based on statistical theory. RSED is best suited for large populations which are homogenous in nature.

RSED V3.1 can be effective only if the following key elements are applied:

1. Population must be realistic. The population is the number of expected occurrences of work to be inspected over a given amount of time, normally one month.

2. The size of the sample is determined from the tables in the RSED V3.1 manual. The sample is the number of work occurrences from the population that will be inspected.

3. The sample is selected by a random process whereby each work occurrence has an equal chance for selection.

4. Once established, the evaluation schedule must be followed during the surveillance period.

5. Observed defects and/or deficiencies outside of the sample cannot be combined with data for random sampling.

The following example will be the contract requirement for one month of service calls:

| | | |
|---|---|---|
| a. | Population | 2,000 |
| b. | Sample | 570 |
| c. | Defects/ deficiencies | 59 |
| d. | Observed defect rare (ODR, B/C) | 10.00% |
| e. | Adjustment factor (from RSED V3.1 Manual) | 1.44% |
| f. | Deductible defect rate (D-E) | 8.56% |
| g. | Extrapolated defects (F xA) | 171 |

By utilizing the RSED method, the number of defects to be deducted from the contractor's invoice is 171 instead of the 59 observed defects identified in the sample.

The use of RSED V3.1 must be stated in the contract. It is recommended that a pre-bid conference be held to ensure that all bidders fully understand the mechanics of RSED.

NAS Whiting Field also implemented RSED into its custodial contract. The total amount of deductions taken for the first year of the contract was $11,178 with $8,770 taken during the first four months. The total amount of deductions taking during the eight months of the current option year totals only $1,090. Needless to say, RSED is accomplishing NAVFAC's goal of higher quality and lower deductions.

The introduction of RSED V3.1 as a method of surveillance coupled with the initiation of FPAF contracts is a positive statement from NAVFAC. The receipt of services and the quality of those services is a genuine area of concern to all who are involved with facility support contracts. □

# Solutions for NAVFAC transportation system's compliance with Public Law 99-272

**By Thomas E. Hale,**
**Arza D. Patterson,**
*and*
**Robert E. Smith**
*Auotmotive Transportation Specialists*
*Transportation Equipment Management Center*
*Pacific Division*
*Naval Facilities Engineering Command*
*Pearl Harbor, Hawaii*

A brainstorming session by Navy automotive transportation specialists at Pearl Harbor resulted in ideas which should allow more efficient handling of transportation operations throughout the Naval Facilities Engineering Command (NAVFAC). The session came about after the passage of Public Law 99-272 which directed the government to reduce its motor vehicle life cycle costs by $150 million by Fiscal Year 1988.

Collecting data and reporting compliance is to be accomplished by the General Services Administration (GSA). Since GSA reporting only includes Civil Engineering Support Equipment (CESE) automotive vehicles (groups A through N), the cost reduction requirement does not apply to special purpose vehicles, cranes, and construction equipment (groups O, P, and Q through Z).

The law further provides that the savings must be accomplished in the areas of acquisition, maintenance, leasing, operation, and disposal via the use of General Services Administration (GSA) Interagency Fleet Management System (IFMS), private contractor, or any other method which is less costly to the government.

Recognizing the implications of Public Law 99-272 a brainstorming session was initiated in October 1987. Conceptually, changes were made to the existing NAVFAC transportation system that would allow NAVFAC to successfully compete with both GSA and private contractors.

NAVFAC must be open to alternatives, it is in that context that the results are presented of conceptual planning about possible routes NAVFAC can take. No doubt there are other solutions that may be just as feasible as those found. Offered are solutions and the rationale behind them.

# 76 complete basic training at CECOS

Seventy-six members of basic class no. 185 graduated on Sept. 9, 1988, from the Naval School, Civil Engineer Corps Officers, Port Hueneme, Calif. The class completed eight weeks of specialized training pertinent to the Navy's needs for shore installation engineering, public works management, construction contracting and administration, and Seabee operations.

Eleven graduates finished with honors--CWO3 Dan L. Henson was the outstanding graduate. Ten graduated with distinction. They were: Lt. William H. Bensinger, CWO2 Michael F. Cook, Lt. Howard H. Haynes, Lt. (j.g.) Jeffrey D. Lamberson, Ens. Antonio M. Edmonds, Ens. Leanne K. Fielding, Ens. Gordon F. Jansky, Ens. Hope Katcharian, Ens. Christine W. Lonie, and Ens. Richard J. Zito.

CWO3 Henson's photograph is indicated by an (*), and those graduating with distinction are indicated by a (•). Those entering Seabee duty are indicated by a (†).

* CWO3 Dan L. Henson to PWC Great Lakes, Ill.

Ens. Robert A. Adinolfi BSEE/Univ. of New Haven to NAS Whidbey Island, Oak Harbor, Wash.

Ens. Tony L. Ammons, Jr. BSEE/Va. Mil. Inst. to WESTDIV Cont. Off., Oakland, Calif.

† 1st Lt. Joel J. Andriamaniraandro to Malagasy Army

Ens. Bryan H. Anschuetz BSEE/Geo. Wash. Univ. to LANTDIV Cont. Off., NAS Keflavik, Iceland

Ens. Kenneth D. Bassler BSCE/Univ. of Roch. to NETC Newport, R.I.

• Lt. William H. Bensinger BSAE/U.S. Naval Acad. to PWC Pensacola, Fla.

Ens. Frederick R. Broome BSCE/Clemson Univ. to LANTDIV Cont. Off., MCAS Cherry Point, N.C.

Due to its unique organizational structure relative to its sister military services within the Department of Defense, the U.S. Navy's "transportation" functions are fragmented. The traffic management function is located in the Naval Supply Systems Command. The personnel movement function is located in the personnel support divisions. The motor vehicle fleet management function, including heavy equipment but excluding material-handling equipment (MHE), is located in NAVFAC. MHE is managed by the Naval Supply Systems Command, but is usually maintained by NAVFAC transportation shops.

Further fragmentation, by involving GSA, would be neither logical nor cost effective. All CONUS and Hawaii Navy Public Works Center (PWC) transportation departments have successfully completed commercial activities reviews, proving that NAVFAC can provide quality transportation services at a lower cost than private contractors. From the data provided, it appears that PWCs currently charge lower vehicle rental rates for government-owned vehicles than GSA within comparable geographic regions.

Even if maintenance, fuel, vehicle disposal, and Civil Engineer Support Office's (CESO's) role in automotive vehicle acquisition were turned over to GSA, the Navy must continue operations for approximately half the CESE fleet. GSA does not provide special purpose/heavy equipment support (groups O, P, and through Q through Z).

*Even if maintenance, fuel, vehicle disposal, and Civil Engineer Support Office's role in automotive vehicle acquisition were turned over to GSA, the Navy must continue operations for approximately half the CESE fleet.*

This potential dichotomy would not be less costly for the government since Navy rental rates are, or can be, reduced below GSA; and in the event of a split function, the transportation overhead would be spread over a smaller base of direct labor.

Since Public Law 99-272 makes provision for "any other method which is less costly to the government," the logical solution for the Navy is to modify the existing system to gain vehicle replacement benefits of Navy Industrial Fund (NIF) operation for appropriated fund activities. Because of the following factors, the Navy is at a distinct disadvantage *vis-a-vis* GSA.

The first major problem is the high maintenance costs for CESE-owned and maintained equipment by Navy appropriated fund activities due to:

- The majority of the Navy's vehicle/equipment fleet is over-age.
- Much of the mileage/hours exceed CESE life expectancy.
- The resource sponsor does not provide sufficient Other Procurement, Navy (OPN) funds for timely CESE replacement.
- Lead time for acquisition through the system is three

years or more, versus one to two years for NIF.

- Congressional constraints have caused a curtailment of vehicle leasing to replace old, high maintenance CESE. This has happened because leasing is more expensive than purchasing, although not necessarily more expensive than continuing to maintain high mileage or over-age equipment.

The second major problem is that the Navy's total capital costs for CESE acquisition is higher than GSA's costs because:

- The Navy does not receive resale funds from disposal of used vehicles to apply to new CESE acquisition.
- The Navy does not purchase normal optional equipment that contributes to higher resale value.
- Due to the extended age and deferred maintenance, most CESE is in poor condition when disposed of, which limits resale value.

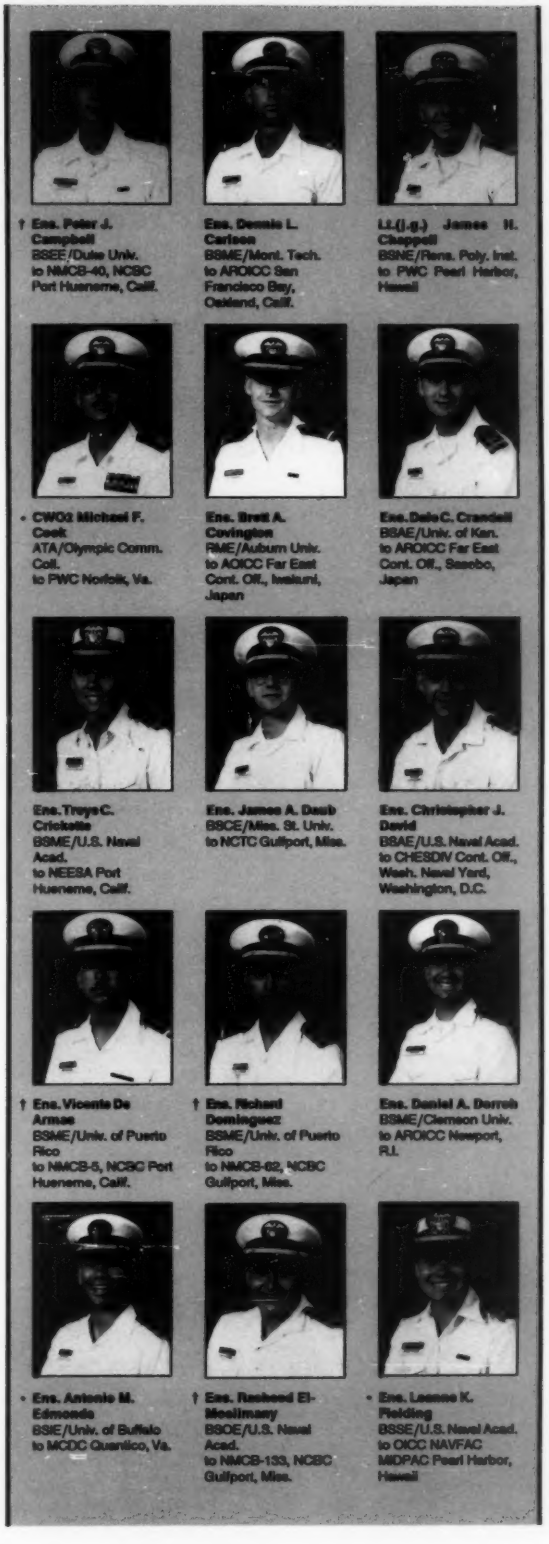
We concluded that the following changes in the system must be adopted if we are to remain competitive:

- Vehicles should be purchased with NIF funds which allow rental rates paid from O&M funds to finance CESE acquisition.
- To promote timely fulfillment of new requirements and subsequent replacement, vehicle acquisition lead time for appropriated fund activities must be reduced from the current three-year cycle.
- CESE should be purchased with optional equipment that will bring the optimum trade-off between purchase cost and resale value upon disposal.
- CESE service life must be predicated on the most economical factors calculated for each geographic location.
- Used CESE must be either traded in when buying new, or the funds from resale returned to the activity to be used for new acquisition. It appears that there are three potential concepts or options that would enhance the competitive posture of NAVFAC transportation:
  - Establishment of transportation centers;
  - Establishment of geographic NIF transportation support; or
  - GSA provision of automotive vehicles to Navy appropriated fund activities.

**Concept 1**
**Establishment of transportation centers**

To correct major problems, effect needed changes, and reduce excessive overhead costs Navywide, the most cost-effective concept appears to be the establishment of NIF transportation centers throughout CONUS and overseas in Hawaii, Guam, Japan, and the Philippines, reporting directly to geographic engineering field divisions (EFDs).

Establishment of regional transportation centers would require realignment of transportation equipment management centers' functions along with transferring the trans-



† Ens. Peter J. Campbell
BSEE/Duke Univ.
to NMCB-40, NCSC Port Hueneme, Calif.

Ens. Dennis L. Carlson
BSME/Mont. Tech.
to AROICC San Francisco Bay, Oakland, Calif.

Lt.(j.g.) James H. Chappell
BSNE/Rens. Poly. Inst.
to PWC Pearl Harbor, Hawaii

• CWO2 Michael F. Cook
ATA/Olympic Comm. Coll.
to PWC Norfolk, Va.

Ens. Brett A. Covington
RME/Auburn Univ.
to AOICC Far East Cont. Off., Iwakuni, Japan

Ens. Dale C. Crandell
BSAE/Univ. of Kan.
to AROICC Far East Cont. Off., Sasebo, Japan

Ens. Troye C. Crickette
BSME/U.S. Naval Acad.
to NEESA Port Hueneme, Calif.

Ens. James A. Daub
BSCE/Miss. St. Univ.
to NCTC Gulfport, Miss.

Ens. Christopher J. David
BSAE/U.S. Naval Acad.
to CHESDIV Cont. Off., Wash. Navel Yard, Washington, D.C.

† Ens. Vicente De Armas
BSME/Univ. of Puerto Rico
to NMCB-5, NCSC Port Hueneme, Calif.

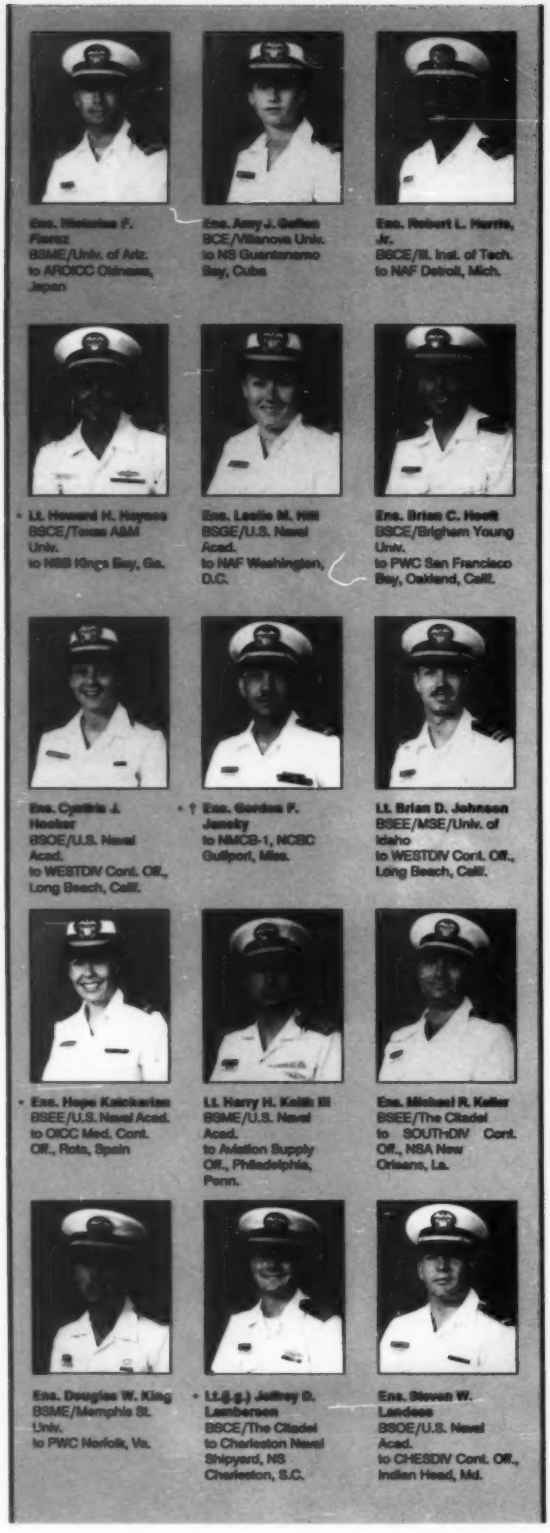
† Ens. Richard Dominguez
BSME/Univ. of Puerto Rico
to NMCB-62, NCBC Gulfport, Miss.

Ens. Daniel A. Dorreh
BSME/Clemson Univ.
to AROICC Newport, R.I.

• Ens. Antonio M. Edmonds
BSIE/Univ. of Buffalo
to MCDC Quantico, Va.

† Ens. Rasheed El-Moslimany
BSOE/U.S. Naval Acad.
to NMCB-133, NCBC Gulfport, Miss.

• Ens. Leanne K. Fielding
BSSE/U.S. Naval Acad.
to OICC NAVFAC MIDPAC Pearl Harbor, Hawaii



Ens. Nemesio F. Florez
BSME/Univ. of Ariz.
to ARDICC Okinawa, Japan

Ens. Amy J. Gellen
BCE/Villanova Univ.
to NS Guantanamo Bay, Cuba

Ens. Robert L. Harris, Jr.
BSCE/Ill. Inst. of Tech.
to NAF Detroit, Mich.

• Lt. Howard H. Haynes
BSCE/Texas A&M Univ.
to NSB Kings Bay, Ga.

Ens. Leslie M. Hill
BSGE/U.S. Naval Acad.
to NAF Washington, D.C.

Ens. Brian C. Hoeft
BSCE/Brigham Young Univ.
to PWC San Francisco Bay, Oakland, Calif.

Ens. Cynthia J. Hooker
BSOE/U.S. Naval Acad.
to WESTDIV Cont. Off., Long Beach, Calif.

• † Ens. Gordon F. Janesky
to NMCB-1, NCBC Gulfport, Miss.

Lt. Brian D. Johnson
BSEE/MSE/Univ. of Idaho
to WESTDIV Cont. Off., Long Beach, Calif.

• Ens. Hope Kaickavian
BSEE/U.S. Naval Acad.
to CICC Med. Cont. Off., Rota, Spain

Lt. Harry H. Keith III
BSME/U.S. Naval Acad.
to Aviation Supply Off., Philadelphia, Penn.

Ens. Michael R. Keller
BSEE/The Citadel
to SOUTHDIV Cont. Off., NSA New Orleans, La.

Ens. Douglas W. King
BSME/Memphis St. Univ.
to PWC Norfolk, Va.

• Lt.(j.g.) Jeffrey D. Lambersen
BSCE/The Citadel
to Charleston Naval Shipyard, NS Charleston, S.C.

Ens. Steven W. Landess
BSOE/U.S. Naval Acad.
to CHESDIV Cont. Off., Indian Head, Md.

portation functions from PWCs and appropriated fund public works department activities. Each transportation center would be responsible for all CESE acquisition, operation, maintenance, fuel, and disposal for supported Navy activities.

This is not a new idea. In fact, the San Francisco Bay area was serviced by such a center for a period of time a number of years prior to the establishment of the PWCs. Except for PWCs, other NIF activities such as shipyards and weapons stations would retain their current transportation functions and not be incorporated into the transportation centers.

Each of the centers would be a separate entity, operating under the Navy Industrial Fund using the Asset Capitalization Program (ACP) as its funding base. NAVFAC would set aside or fence the PWC transportation departments' portions of the public works centers' ACP funds to provide centers with initial funds.

The establishment of NIF procurement for all Navy CESE would provide the ability to replace equipment at the optimum life cycle costs. A prominent feature of this NIF program alleviates the resource sponsor from having to provide OPN funds to buy CESE, and reduces the long lead time for procurement. This concept also saves Operations and Maintenance, Navy (O&MN) funds, as activities will be provided newer, more reliable vehicles which will reduce downtime and maintenance costs due to warranty coverage.

The activities under the regional center concept would transfer their allowances/inventory to their respective center. After this is accomplished, the center would review each activity's requirements to ensure that the right quantity/type of equipment is on-hand to perform mission-support responsibilities. Excess equipment would either be reassigned to other activities under the center, be offered to other Navy transportation centers on a reimbursable basis, or be sold to recoup the residual value.

The centers would develop a multi-year replacement plan for each supported activity to begin replacing over-age vehicles within one year after the consolidation phase is completed. This plan would help to reduce the total maintenance function to primarily safety inspections and reliability inspections. Most other repairs on the newer vehicles would be accomplished by warranty. In addition, newer standardized motor vehicle fleets would reduce requirements for parts, support, shop facilities, and mechanics while enhancing customer satisfaction.

The centers would initiate the procurement of standard equipment through GSA to reduce present lead time and procurement costs. Where applicable, existing GSA in-house contracts would be used to the maximum extent possible. For nonstandard/special purpose CESE acquisition, CESO would retain a staff to support the regional transportation centers. This staff would review/develop unique CESE specifications and process requisitions for purchase. Excess/over-age equipment would be sold, and funds would be used to purchase new equipment or would be returned to the corpus.

Transportation operations personnel at each supported activity would be under the control of the applicable transportation center and would provide complete CESE trans-

portation services to its customers. Personnel could be moved from one installation to another to support peak workloads. Day-to-day business would be conducted as usual, and assignments of equipment to fill allowance requirements would be the responsibility of the center's transportation manager.

Equipment maintenance would be provided by the responsible center which would make the determination on the degree of work/cost needed to maintain the fleet. The center's staff would administer and periodically review a preventive maintenance and safety inspection schedule. Service/minor repairs would be accomplished in-house for those activities with 75 or more pieces of CESE. Contract equipment maintenance would be considered for smaller fleets.

An appropriate staff at the Commander-in-Chief levels will be required for coordination with claimants, CESO, and NAVFAC. For example, a staff would be retained at Commander in Chief, Pacific Fleet (CINCPACFLT)/Pacific Division, NAVFAC (PACDIV) to serve as the geographic NIF manager for appropriated fund activities located on foreign soil. In a similar manner, a NIF office would be established at Commander in Chief U.S. Naval Forces Europe (CINCUSNAVEUR) to acquire vehicles for naval activities in the European theater. In addition to the NIF management function, these transportation staffs would also serve the theater commanders in matters involving planning and management for all shore transportation support.

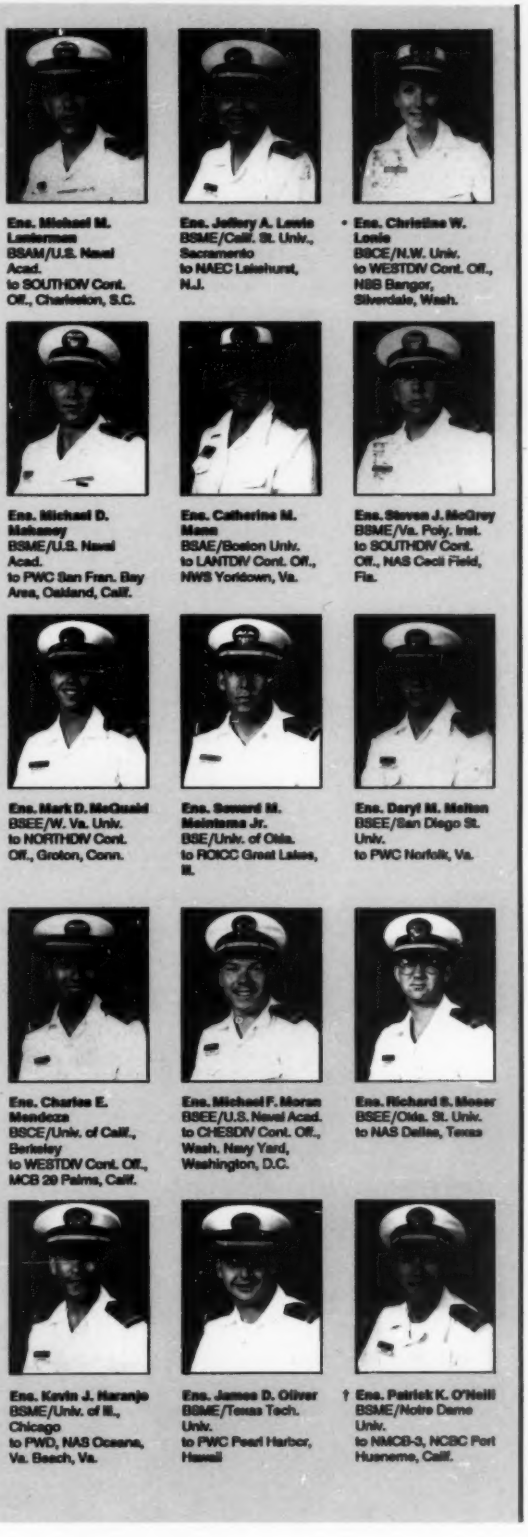
**Concept 2**
**Geographic NIF transportation support**

This second option, in order of perceived desirability, would provide NIF transportation support on a geographic basis using a combination of existing PWC transportation departments and establishment of EFD-managed NIFs for appropriated fund activities too remote to use PWCs. The PWCs would expand their support to activities located within a 75- to 100-mile radius, which would consolidate their allowances with PWC.

The PWC would review each activity's inventory and incorporate its requirements into a multi-year replacement plan. These activities would reimburse the PWC by monthly rental rates that include depreciation, fuel, maintenance, and overhead. Supported activities would continue their current method of transportation operations, including dispatching, provision of drivers/operators, rigging services, etc.

For activities that would come under the cognizance of the EFD NIF management staffs, the allowances would remain at the activity and be managed by the geographic EFD. Provision of maintenance and fuel would be the responsibility of the EFD who would either contract with the activity or commercial vendor depending on cost effectiveness. Each non-NIF supported activity would pay a monthly rental that recoups the investment, fuel, and maintenance costs.

The current claimant-oriented transportation equipment



**Ens. Michael M. Lauderman**
BSAM/U.S. Naval Acad.
to SOUTHDIV Cont. Off., Charleston, S.C.

**Ens. Jeffery A. Lewis**
BSME/Calif. St. Univ., Sacramento
to NAEC Lakehurst, N.J.

• **Ens. Christine W. Lonie**
BSCE/N.W. Univ.
to WESTDIV Cont. Off., NSB Bangor, Silverdale, Wash.

**Ens. Michael D. Mahaney**
BSME/U.S. Naval Acad.
to PWC San Fran. Bay Area, Oakland, Calif.

**Ens. Catherine M. Mann**
BSAE/Boston Univ.
to LANTDIV Cont. Off., NWS Yorktown, Va.

**Ens. Steven J. McGrey**
BSME/Va. Poly. Inst.
to SOUTHDIV Cont. Off., NAS Cecil Field, Fla.

**Ens. Mark D. McQuaid**
BSEE/W. Va. Univ.
to NORTHDIV Cont. Off., Groton, Conn.

**Ens. Seward M. Meintsma Jr.**
BSE/Univ. of Okla.
to ROICC Great Lakes, Ill.

**Ens. Daryl M. Melton**
BSEE/San Diego St. Univ.
to PWC Norfolk, Va.

**Ens. Charles E. Mendoza**
BSCE/Univ. of Calif., Berkeley
to WESTDIV Cont. Off., MCB 29 Palms, Calif.

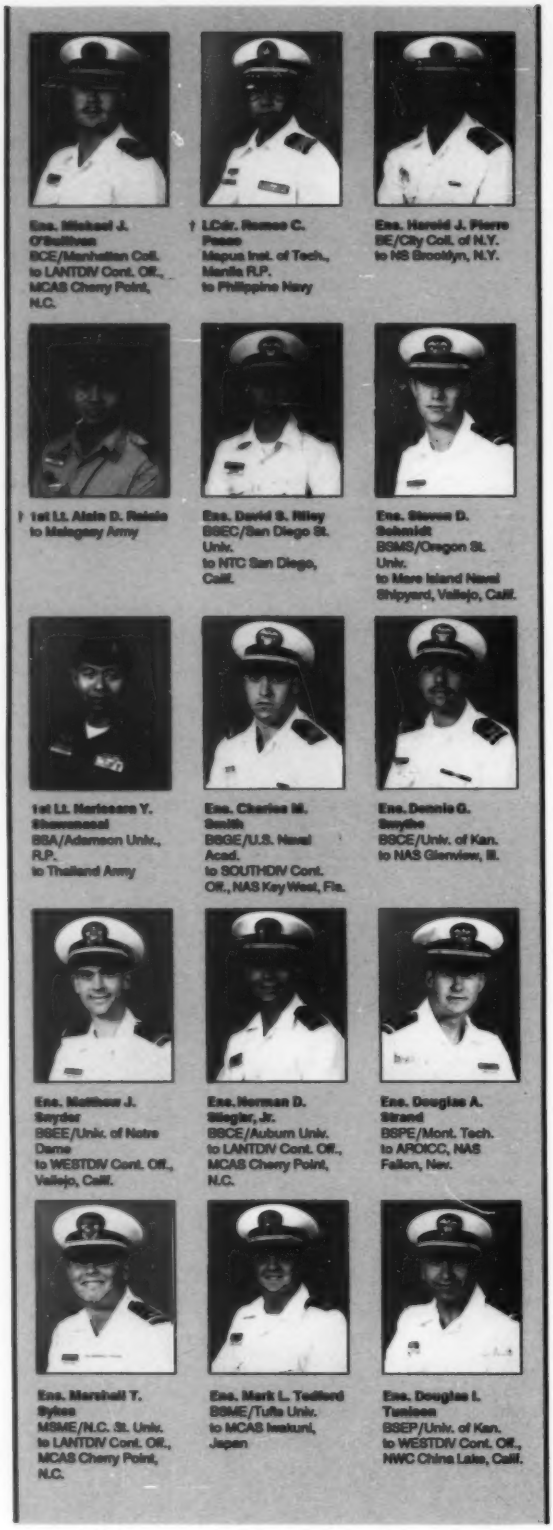
**Ens. Michael F. Moran**
BSEE/U.S. Naval Acad.
to CHESDIV Cont. Off., Wash. Navy Yard, Washington, D.C.

**Ens. Richard S. Moser**
BSEE/Okla. St. Univ.
to NAS Dallas, Texas

**Ens. Kevin J. Naranjo**
BSME/Univ. of Ill., Chicago
to FWD, NAS Oceana, Va. Beach, Va.

**Ens. James D. Oliver**
BSME/Texas Tech. Univ.
to PWC Pearl Harbor, Hawaii

† **Ens. Patrick K. O'Neill**
BSME/Notre Dame Univ.
to NMCB-3, NCBC Port Hueneme, Calif.



Ens. Michael J. O'Sullivan
BCE/Manhattan Coll.
to LANTDIV Cont. Off., MCAS Cherry Point, N.C.

† LCdr. Romeo C. Peano
Mapua Inst. of Tech., Manila R.P.
to Philippine Navy

Ens. Harold J. Pierre
BE/City Coll. of N.Y.
to NS Brooklyn, N.Y.

† 1st Lt. Alois D. Reisio
to Malagasy Army

Ens. David S. Riley
BSEC/San Diego St. Univ.
to NTC San Diego, Calif.

Ens. Steven D. Schmidt
BSMS/Oregon St. Univ.
to Mare Island Naval Shipyard, Vallejo, Calif.

1st Lt. Narissara Y. Shawnasai
BBA/Adamson Univ., R.P.
to Thailand Army

Ens. Charles M. Smith
BSGE/U.S. Naval Acad.
to SOUTHDIV Cont. Off., NAS Key West, Fla.

Ens. Dennis G. Smythe
BSCE/Univ. of Kan.
to NAS Glenview, Ill.

Ens. Matthew J. Snyder
BSEE/Univ. of Notre Dame
to WESTDIV Cont. Off., Vallejo, Calif.

Ens. Norman D. Stiegler, Jr.
BSCE/Auburn Univ.
to LANTDIV Cont. Off., MCAS Cherry Point, N.C.

Ens. Douglas A. Strand
BSPE/Mont. Tech.
to AROICC, NAS Fallon, Nev.

Ens. Marshall T. Sykes
MSME/N.C. St. Univ.
to LANTDIV Cont. Off., MCAS Cherry Point, N.C.

Ens. Mark L. Tedford
BSME/Tufts Univ.
to MCAS Iwakuni, Japan

Ens. Douglas I. Tunison
BSEP/Univ. of Kan.
to WESTDIV Cont. Off., NWC China Lake, Calif.

management centers could be retained and modified to provide billets and personnel to re-establish transportation staffs at Northern Division (NORTHDIV) and Western Division (WESTDIV) of NAVFAC. The EFD staffs would work directly with GSA and CESO on matters of acquisition and resale of equipment.

This concept is not envisioned as being as cost effective as transportation centers. The primary difference is the inherent overhead costs associated with the PWC-type operation wherein the general and administrative (G&A) charges are significantly greater than the services received by their transportation departments would warrant.

**Concept 3**
**GSA provision of automotive vehicles to appropriated fund activities**

A third concept using GSA assistance for appropriated fund activities is again for the PWCs to expand their geographical areas of CESE support as in concept 2.

The current claimant-oriented transportation equipment management centers would be retained and transportation staffs re-established at NORTHDIV and WESTDIV. The EFD staffs would work directly with the appropriate GSA fleet management centers, to buy/dispose of groups A through N vehicles for appropriated fund activities not supported by a PWC.

. . . the best method of acquiring CESE is through the Navy Industrial Fund.

The activity would continue its current operations, maintenance, and fueling methods and only pay a monthly depreciation fee to GSA. (NAVFAC Headquarters has determined that it is possible for GSA to provide vehicles in this method on an exception basis.) In summary, we have concluded that the best method of acquiring CESE is through the Navy Industrial Fund. We've discussed three concepts to implement this method: transportation centers, geographic EFD-managed NIF support for appropriated fund activities, and GSA acquisition of automotive vehicles for appropriated fund activities.

There are probably other alternatives which could be successful if properly planned and implemented.

The old saying, "Don't put all your eggs in one basket," is particularly appropriate for military logistics planning. Monopoly, the exclusive command of supply, is not desirable in a business environment. Competition is the major reason for the success of our capitalistic system. Congress has provided for competition in PL 99-272. We in NAVFAC must accept the challenge. □

# CWO4 Eno wins Commander's Award

CWO4 James M. Eno, CEC, USN, Retired, accepts a plaque from Captain J. B. Green, Jr., CEC, USN, for winning the Commander's Award for the best article for the publication year 1986-87 in the *Navy Civil Engineer*.

The coveted Commander's Award for the outstanding article contribution to the *Navy Civil Engineer* magazine for publication year 1986-87 went to CWO4 James M. Eno, CEC, USN, Retired.

Eno won the award for his article, *A Methodology for Determining Potential Incrementation in Minor Construction*, which appeared in the Spring 1987 issue.

Presentation of a bronze plaque award was made to Eno by Captain J. B. Green, Jr., CEC, USN, during special ceremonies in Yokosuka, Japan. In addition to the plaque, a congratulatory letter was received from Rear Admiral B. F. Montoya, Commander of the Naval Facilities Engineering Command (NAVFAC) and Chief of the Civil Engineer Corps, which said in part: "Your superb article provides valuable information on an important subject. I hope we can expect future contributions from you . . . Congratulations!"

### Honorable Mention Awards

Three authors received Honorable Mention Awards and letters from RAdm. Montoya for writing excellence.

LCdr. Edward F. St. Germain, CEC, USN for *Working Environment Important in Determining Project Productivity*, Spring 1987 issue.

Dr. Edward S. Hope (LCdr.), CEC, USN, Retired) for his article, *The Navy Salutes*, Winter 1986-87 issue.

Lt. Gregory L. Maffett, CEC, USN for his article, *Energy Reduction Through Third-Party Contracting*, Fall 1986 issue.

Nominations for the awards were made by a special committee comprised of Captain Rufus J. Pearson, III, CEC, USN, Commanding Officer of the Naval School, Civil Engineer Corps Officers; Elaine McNeil, NAVFAC Public Affairs Officer; and Les Helsdon, former Editor, *Navy Civil Engineer*.

All feature articles published during the publication year are considered for awards by the committee.

**Ens. Heather A. Turner**
BSCE/Va. Poly. Inst.
to NAS Key West, Fla.

† **Ens. Scott J. Waldelich**
BSM/U.S. Naval Acad.
to NMCB-40, NCBC
Port Hueneme, Calif.

**Ens. Gary L. Wiek**
BSME/Mich. Tech. Univ.
to NSA Headquarters, Wash. Navy Yard, Washington, D.C.

**Ens. Bruce C. Wilkinson**
BSCE/The Citadel
to SOUTHDIV Cont. Off., NAS Cecil Field, Fla.

**Ens. Charles R. Wilson**
BSEE/Fla. Intl. Univ.
to NAS Keflavik, Iceland

**Ens. Loren L. Wieniewski**
BSSE/U.S. Naval Acad.
to WESTDIV Cont. Off., MCAS El Toro, Santa Ana, Calif.

**Ens. Robert L. Zemina**
to PWC Guam, Marianas Islands

† **Ens. Richard J. Zito**
BSCE/N.J. Inst. of Tech.
to NMCB-40, NCBC
Port Hueneme, Calif.

# NAVY CIVIL Engineer

## SURVEY RESULTS

**I AM:**
27 USN
22 USNR
18 USNR (Inactive)
61 Civilian employee
2 Paid subscriber
7 Other

**MY GRADE IS:**
90 Military:
Capt.--12; Cdr.--17; LCdr.--15; Lt.--15; Lt. (j.g.)--2; Ens.--0; CWO--4; CPO--23; Enlisted--2

61 Civilian:
GS/GM-14--6; GS/GM-13--11; GS/GM-12--24; GS/GM-11--11; GS-9--8; GS-8--1

**I AM ASSIGNED TO:**

| | |
|---|---|
| 7 NAVFAC | 17 ROICC |
| 23 EFD | 5 Staff |
| 12 PWC | 28 Reserves |
| 4 NCF | 10 CBC |
| 16 Other | |

I have 16 (average) years of accredited education (elementary, high school, college).
195 hold degrees; most in Civil Engineering: Ph.D.--5; Master--42; Bachelor--91; J.D.--3; Associate--14.
I have 19 (average) years of government service (civilian and armed services combined).
I have--20; have not--140 contributed articles or material to the *Navy Civil Engineer*.
I have been a reader of the *Navy Civil Engineer* for 10 years (average).
I usually read: all--56; more than half--72; less than half--20; hardly any--2 of the contents of the *Navy Civil Engineer*.

### MY RATING OF THE MAGAZINE

| | Excellent | Good | Fair | Poor |
|---|---|---|---|---|
| My *overall* opinion | 84 | 57 | 7 | 0 |
| Editorial content | 63 | 82 | 10 | 0 |
| Format | 84 | 56 | 8 | 2 |
| Page design | 75 | 63 | 14 | 2 |
| Photographs | 79 | 58 | 13 | 0 |
| Printing and paper stock | 105 | 27 | 2 | 1 |
| Mailing and distribution | 71 | 48 | 16 | 9 |

### DELIVERY AND AVAILABILITY

153 I receive my copy through the mail.
137 It arrives in good condition.
0 It does not arrive in good condition.
50 Copies are easily and readily received.
6 Copies are not easily obtained.
4 I read my copy in a library or other central source.
The copy I read is shared with 3 (average) others.

### FREQUENCY

I prefer to receive the magazine:
46 Monthly
35 Bi-monthly
72 Quarterly

### DEPARTMENTS

| | I Read | Don't Read |
|---|---|---|
| Speaking from topside | 125 | 16 |
| Advice of counsel | 117 | 22 |
| Situation report | 115 | 18 |
| Comments/questions | 129 | 12 |
| News worth reviewing | 135 | 4 |
| Instructor in the spotlight | 81 | 46 |

### SUBJECT PREFERENCES

| | I Like | Don't Like |
|---|---|---|
| Research and development | 123 | 11 |
| Management | 114 | 15 |
| Education and professional development | 114 | 16 |
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*Thanks for your comments!*

Thank you for responding to our readership survey published in the Winter 1987-88 issue. One hundred sixty-two survey forms were returned to us, many with added comments which were appreciated.

A tally of the number of answers received for each question in the "quick-answer" quiz is published in its respective position above. Some readers did not answer every question; consequently, the numbers do not always total.

# Have your heard about the Reserves?

## *For a challenging, rewarding career . . .*

If you are a young construction professional in civilian practice or civil service, or are a graduating engineering or architecture college senior who has already selected a civilian career path, the Reserve Civil Engineer Corps may have a place for you as a commissioned officer.

Qualified young professionals have the chance to achieve tremendous personal and professional satisfaction through . . .

- Direct appointment as an ensign, Civil Engineer Corps, United States Naval Reserve
- Challenging assignments within Reserve Naval Construction Force units in your geographic locale, in areas paralleling active CEC duty in the Seabees or in facilities management
- Annual active duty for training that is meaningful and rewarding
- Development of leadership and technical skills that will carry over directly into your civilian profession
- New and lasting friendships and associations with other top-notch construction professionals
- Pay and responsibility that increases as you grow and advance
- A Naval Reserve retirement package for a little something extra in your old age
- Finally, and most importantly, the pride in knowing that you are helping preserve the freedom of your country as you grow in your profession

## *Here's what you can do . . .*

If you are a young engineer or architect, male or female, please call the Reserve representative listed below.

**LCdr. Paul Donado**
Atlantic Region, RNCF
Naval Base Charleston, SC 29408
Phone: (803) 743-2650/4322
AV 564-2650/4322

**Lt. Steve Knapowski**
Central Region, RNCF
Building 1, Naval Base
Great Lakes, IL 60088
Phone: (312) 688-6955/6
AV 792-6955/6

**LCdr. Bob Bengtson**
Western Region, RNCF
1220 Pacific Highway, Building 131
San Diego, CA 92132
Phone: (619) 532-1443/2970
AV 522-1443

**Or, contact an active duty EFD Accessions Officer listed on the inside front cover for further information and details . . .**

Navy Civil Engineer, Code 20M
Naval School, Civil Engineer Corps Officers
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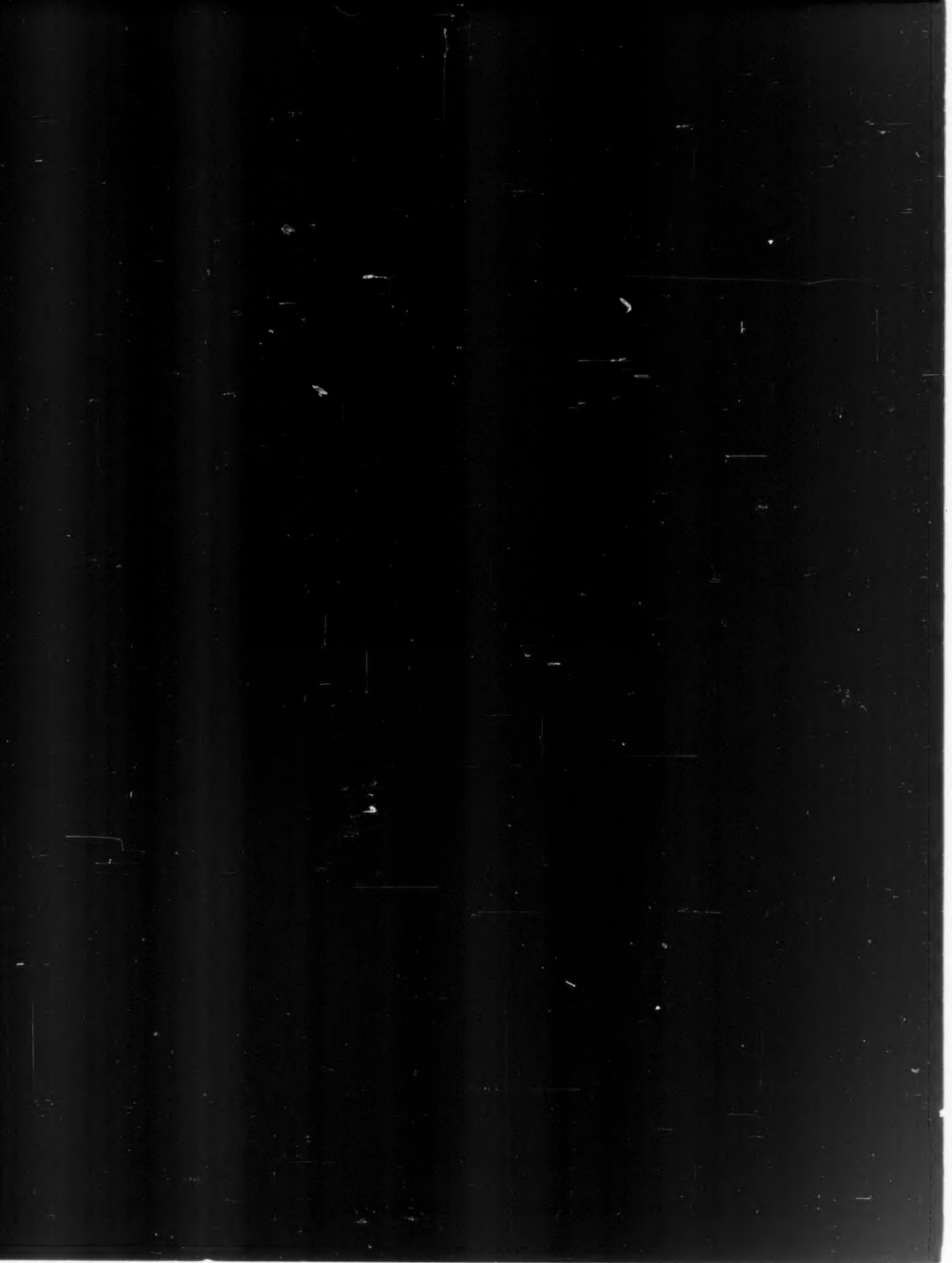
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